Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXI, No. 12 FEATURING: ELECTROPLATING December 1948

Metals Review

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A.S.M. REVIEW OF METAL LITERATURE

SPECIAL FEATURES

DEPARTMENTS

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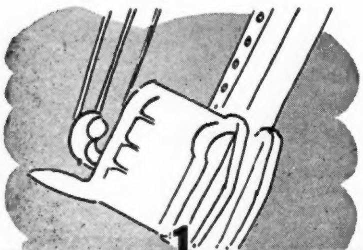
A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month



1 ORE BENEFICIATION

1a—General

1a-37. Infrared Light for Mineral Determination. Rene Bailly. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 519-531.

By adapting photo-electric cells, sensitive to infrared, to different optical instruments used in mineralogy, it is possible to obtain the refractive indices, birefringence, and absorption indices. 32 ref.

1a-38. The Dark-Field Color Immersion Method. Nelson B. Dodge. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 541-549.

With dark-field illumination, color criteria provide an alternative to the usual methods for comparing index of crushed grains with immersion media. Since organic immersion liquids have steeper dispersion curves than inorganic solids, spectrum colors are produced from white light by refraction at interfaces of grains and liquid.

1a-39. Beneficiation of Mineral Ores. *Journal of Scientific & Industrial Research,* v. 7, Sept. 1948, p. 394-397. Reprinted from *Transactions Mining, Geological & Metallurgical Institute of India,* v. 41, 1946, p. 33-175.

A series of investigations on the beneficiation of phosphatic, antimony, flake graphite, sulphur, and chromite ores were recently carried out by the Utilization Branch of the Geological Survey of India.

1b—Ferrous

1b-20. Iron Production Increased 38.2% by Improved Size Preparation and Bulk Blending of Ores. Robert R. Williams, Jr. *Steel,* v. 123, Nov. 8, 1948, p. 112, 115-116, 118, 136, 138, 140.

Previously abstracted from *American Iron and Steel Institute, Preprint,* 1948. See item 1b-14, 1948.

1b-21. Iron Ore Reserves in Michigan. Franklin G. Pardee. *Mining and Metallurgy,* v. 29, Nov. 1948, p. 613-614.

Including prospects for beneficiation.

1c—Nonferrous

1c-71. Concentration at the Midvale Mill. Rollin A. Pallanch. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 544-547.

Deals with Midvale, Utah, plant of U. S. Smelting, Refining, and Mining Co. Company where custom Pb-Zn-Fe ores are treated by flotation for recovery of Pb, Zn, Ag, and Au.

1c-72. Concentrating Lead-Zinc Ore at the Bayard Mill. P. V. Brough and K. B. Gillaspie. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 562-566.

Procedures and equipment of Bayard, N. Mex., mill of U. S. Smelting, Refining, and Mining Co. Flow sheet.

1c-73. Investigation of the Cape Resier Zinc-Copper-Lead Mine, Hancock County, Maine. S. B. Levin and Robert S. Sanford. *Bureau of Mines, Report of Investigations, No.* 4344, Sept. 1948, 18 pages.

Results of flotation tests on samples from this source.

1c-74. Diamond Drilling at the Big Ore Bank Magnetite Deposits, Lincoln County, N. C. Austin B. Clayton and W. Bruce Montgomery, Jr. *Bureau of Mines, Report of Investigations,* No. 4347, Sept. 1948, 6 pages.

Results of magnetic separation tests.

1c-75. Non-Ferrous Base Metals in Quebec. W. M. Bonham. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 174-181.

Deposits, production facilities, and methods. Flow sheet for production of Cu and Zn concentrates. Noranda's pilot plant for production of elemental sulphur from iron sulphide. 13 ref.

1c-76. The Use of Ammoniacal Copper Sulphate in a High-Alkaline Pulp to Treat Contaminated Zinc Ore in Normetal Concentrator. F. G. Lendrum. *Canadian Mining and Metallurgical Bulletin,* Oct. 1948, p. 583-590.

Describes the ore; development of the present milling methods; milling operations, including flowsheet; and costs.

1c-77. Amalgamation of Tarnished Gold. H. T. Airey. *Canadian Mining and Metallurgical Bulletin,* Oct. 1948, p. 590.

Addition of an oxidizing agent proved useful.

1d—Light Metals

1d-7. A Process for the Production of Iron-Free Alum. Part 2. Pilot-Plant Development. William K. Cunningham, Edwin A. Gee, and R. August Heindl. *Bureau of Mines, Report of Investigations,* No. 4351, Sept. 1948, 60 pages.

A pilot-plant development for extraction of alumina from low-grade bauxite and clays demonstrated conclusively the chemical and mechanical feasibility of a solvent purification process for aluminum sulphate. Process is not economically feasible now.

2 SMELTING, REDUCTION and REFINING

2a—General

2a-23. Ein Beitrag zur Deutung des Phänomens der umgekehrten Blockseigerung. (An Explanation of the Phenomenon of "Inverted" Ingot Segregation.) H. Röhrig. *Metall,* Feb. 1948, p. 33-35.

An explanation for the segregation of a portion of the alloy constituents at the surface of the ingot.

2b—Ferrous

2b-185. Ferrous Metals Manufacture & Properties. S. L. Case. *Metals Review,* v. 21, Oct. 1948, p. 3, 5, 7, 9.

Highlights of noteworthy articles published during the past 12 months. References to A.S.M.'s "Review of Current Metal Literature".

2b-186. Elimination of Sulphur in the Blast Furnace. D. Joyce. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1207-1211, 1226-1227.

Previously abstracted from *Journal of the Iron and Steel Institute,* v. 159, July 1948, p. 291-296. See item 16b-72, 1948.

2b-187. Open Hearth Slag Control. George Teskey. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 98-101.

Use of "pancake" method at Bethlehem Pacific's South San Francisco plant.

2b-188. Application of Oxygen to Steel-Making. W. C. Newell. *Nature,* v. 162, Oct. 2, 1948, p. 518-519.

2b-189. Cupola Hot Metal for the Openhearth. E. S. Kopecki. *Iron Age,* v. 162, Oct. 21, 1948, p. 76-81.

In an attempt to minimize openhearth raw-material problems, four nonintegrated steel mills have resorted to the above practice. The success of these efforts is indicated by the cost and operating data presented for three of these plants.

(Turn to page 6)

Electroplating and Electroforming

Fundamental and Practical Advances Recorded During the Past 18 Months

By John G. Beach

THE READINESS of electroplaters to take advantage of the greater knowledge resulting from war developments reflects a forward step for the industry. Fundamental research has advanced their understanding of the basic phenomena of electroplating; as practical experience is gained in the application of new research developments, this understanding is expected to increase.

Electroplating for engineering uses, particularly electroforming, has advanced to a prominent position in the industry and presents another practical tool to engineers.

Decorative and Protective Plating

During the past few years Mr. and Mrs. John Q. Public have become increasingly aware that electroplated coatings do not last forever. Results of exposure tests and reports of service failures have emphasized that the durability of a finish depends, to a large degree, on the thickness of the plate. A factor of considerable concern is how to produce added thickness with a minimum increase in cost. Nixon and Olsen (8-10, Feb., 1948)* report cost cutting advantages obtained by the use of improved bright and semi-bright copper and nickel plating, and by plating chromium over bright nickel without unracking. These advantages are evident in less racking and unracking; in fewer, but better, racks for a given volume of production; elimination of cleaner between nickel and chromium tanks; and little or no buffing.

Chromium contamination in cleaning and plating solutions is a long-recognized bugaboo. Such contamination is accentuated by using the same racks throughout nickel and chromium plating cycles. A successful preventive measure consists of thoroughly rinsing the racks after chromium plating plus a 2-min. anodic treatment in a sodium carbonate solution (3 to 6 oz. per gal.) before recycling (8-10, Feb., 1948). Caldwell (8-15, March, 1948) suggests a curative measure for the effects of chromium—namely, the addition of sodium hydrosulphite to the electrolytes.

Automatic machine plating is another cost-cutting innovation. According to Bregman (8-103, 1947), one man using a fully automatic machine, gold plated 13,000 parts (6500 assemblies) per hr. This volume of production using the older method of batch tank plating would have required 100 operators.

Bregman covers the advantages and limitations of plating machines, plating costs with fully automatic conveyors, and the operating characteristics of several machines that are available on the market. The technical advantages are continuous production, greater uniformity of product, lower percentage of rejects, better planning, and improved working conditions. The economic advantages are increased output, lower refinishing costs, reduced health hazards, and reduced drag-out of solution. Disadvantages include high initial cost and less flexibility for changes in work schedules. This lack of flexibility has been alleviated in some plants by the coordinate use of fully automatic machines for standardized operations, semiautomatic machines for less standardized operations, and still tanks for temporary operations.

Successful production plating must give a uniform product. To maintain optimum results from plating solutions, especially bright plating, a certain degree of purity and concentration is required. Divergence from this control results in variations in the plated product that might greatly affect the resistance to wear or corrosion. Langford (8-123, June 1948) discusses various aspects of these analysis and control problems. Case (8-79, May 1948) has introduced several designs for continuous electrolytic and carbon purification. Both authors make it clear that the main function of analytical control and solution purification should be to prevent trouble and thus promote as steady a flow of uniformly finished product as possible.

Speculum plate (8-136, 1947), developed by the British Tin Research Institute, is described as an electroplated alloy of 45% tin and 55% copper. It is between silver and chromium in appearance, and has good corrosion and nontarnishing characteristics for inside applications. Suggested uses are for table service, plumbing fixtures, jewelry, flat irons, metal trim, and headlight reflectors.

Tin plating of strip steel has made rapid strides. Thirty-eight-inch strip has been plated with 0.03 mil of tin at a speed of 1000 ft. per min. (8-72, 1947). A current density of 225 amp. per sq. ft., in an alkaline stannate bath, was used.

Cobalt and cobalt-nickel alloys, as well as nickel, have been plated on steel or nickel by the "Electroless" process, previously reported for nickel alone (8-131, 1947). The process depends on the chemical reduction (no electric current) of nickel and cobalt salts with hypophosphite.

Tin-zinc (8-64, 1947), nickel-zinc, and nickel-tin (8-102, May 1948) electroplated alloys offer corrosion protection competitive to hot-dip zinc coatings on steel.

Base Metal

Economy is the basic reason for electroplating, according to Pronty. He offers specific guidance as to the application and limitations of plating on ferrous (8-40, 1947) and nonferrous base metals (8-57, 1947). Too often the base metal is not given adequate consideration in the original design. Changing the base metal may permit a less costly finishing cycle and yet retain the same appearance and protection originally specified.

Plating on Magnesium and Aluminum

Until recently, no commercially acceptable process had been developed for plating on magnesium. Attempts, in general, had been rather discouraging because of the activity of magnesium in acids and many neutral electrolytes, plus the ease with which its hydroxide forms. An outstanding development, therefore, is a process for plating on magnesium that simulates the zincate process for plating on aluminum (8-112, June

(*Turn to page* 7)

*Literature references are cited by the corresponding item number in the *Review of Current Metal Literature* instead of repeating entire title, author, and source; this information can be obtained by referring to *Metals Review* for the month indicated in 1948, or to the 1947 bound volume of the A.S.M. *Review of Metal Literature* (Volume 4).

Construction details are also given of cupolas capable of operating continuously for up to 98 hr. between refractory repairs.

2b-190. Round Ingots Reduce Steelmaking Costs. *Iron Age,* v. 162, Oct. 21, 1948, p. 81.

Brief item cites report of German practice from *Iron and Coal Trades Review,* Aug. 6, 1948.

2b-191. Contributo allo studio de l'uso dell'aria arricchita di ossigeno nella fabbricazione della ghisa. (Contribution to the Study of the Use of Oxygen-Enriched Air in Cast-Iron Production.) Cornelio Ricci. *La Metallurgia Italiana,* v. 40, May-June 1948, p. 93-104

The diagrams of D. Castro, plotted on the basis of W. Mathesius' research, are analyzed. The analysis shows that the use of enriched air (26% by weight) decreases considerably the consumption of coke, at the same time increasing the rate of production and the quality of the product.

2b-192. Il proporzionamento della ghisa e del rottame nel forno Martin-Siemens. (Ratio of Cast Iron and Scrap in the Charge of an Openhearth Furnace.) Vittorio Gargiulo. *La Metallurgia Italiana,* v. 40, May-June 1948, p. 105-107.

Proposes use of a specially developed diagram.

2b-193. Contribution a la désulfuration dans le four a induction a H.F. (A Study of Desulfurization in a High-Frequency Induction Furnace.) H. Haemers. *Revue de Métallurgie,* v. 45, July 1948, p. 211-214; discussion, p. 214.

The problem of slag attack on furnace linings during desulfurization of steel by use of sodium carbonate, using various furnace designs and electrode systems.

2b-194. Réduction des minerais de fer par le gaz des hauts fourneaux. (Gaseous Reduction of Iron Ore in Blast Furnaces.) E. Herzog. *Revue de Métallurgie,* v. 45, July 1948, p. 215-230; discussion, p. 230.

The mechanism was studied, using the different low and medium-grade iron ores (21.5 to 46.0% Fe) available in France. Methods of investigation and apparatus used. Method adopted for determination of Fe in the ore and in the reduced sinter.

2b-195. Laramie Sponge-Iron Pilot Plant. T. L. Johnston and W. M. Mahan. *Bureau of Mines, Report of Investigations,* No. 4376, Sept. 1948, 45 pages.

The development and operation of pilot plant. Flow scheme and results of tests on various ores. The production of sponge iron in a large rotary kiln was investigated in individual tests.

2b-196. Statistical Methods in the Iron and Steel Industry. A. W. Swan. *Engineering,* v. 166, Oct. 15, 1948, p. 379-380. A condensation.

Problems involved in statistical study of steelworks operations, pointing out that the typical problem is of a highly complex character as compared with, for example, a machine-shop operation.

2b-197. Sampling Openhearth Slags at Varying Depths. *Iron Age,* v. 162, Nov. 11, 1948, p. 105.

Briefly describes this Russian device on the basis of an article in *Engineers' Digest* (American Edition), Sept. 1948.

2b-198. Advantages of Bessemer Steel in Producing Tubular Products. E. G. Price. *Steel,* v. 123, Nov. 15, 1948 p. 116, 119-120, 122, 124.

In an integrated plant, cost of making bessemer ingots over a period of years should be less than that of openhearth ingots. Also, during high scrap prices, the bessemer plant has a definite advantage.

2b-199. Kinetics of the Removal by Oxidation of Manganese, Silica, and Sulphur From Molten Iron. (In Russian.) A. M. Samarin and L. A. Shvartsman. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, May 1948, p. 565-574.

Rates with the slag phase absent. A simple first-order equation describes the kinetics of these processes.

2b-200. Influence of Silicic Acid on the Equilibrium of Liquid Iron With the Simplest Basic Slags. (In Russian.) O. Esin. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, May 1948, p. 617-623.

Experimental data for several liquid slag two-phase systems from the point of view of the theory of perfect ionic solutions proposed by Temkin. Theoretical and experimental data fully confirm this theory. 14 ref.

2b-201. Nodular Cast Irons. H. Morrogh and J. Grant. *Canadian Metals & Metallurgical Industries,* v. 11, Nov. 1948, p. 18-22, 32. A condensation. Reprinted from *Metallurgia,* v. 38, July 1948, p. 153-160.

2b-202. Ingot Structures in a Series From Rimmed to Killed Steels Made From the Same Cast. P. M. Macnair. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 151-163.

A series of ten ingots, ranging from box-hat, through rimming, and rising to killed steel, was made from the same cast by additions of iron oxide and aluminum to the molds. Vertical cross sections through the center-line were prepared and the ingots examined for blowhole appearance and chemical segregation of the major elements, carbon, sulphur, phosphorus, and manganese. A theory is advanced to explain the method of formation of the various types from wild to killed steel.

2b-203. Ingot Surface Defects in Structural Steels. L. Reeve. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 169-176.

Causes are considered, the controlling factors being divided between those acting in the furnace and those acting outside the furnace. Results of a detailed statistical analysis of the causes of defects in steel produced from 19,600 tons of 85-cwt. ingots of "balanced" quality carbon steel used for the production of steel joists.

2c—Nonferrous

2c-56. Midvale Lead Smelter for Company and Custom Ores. Casper A. Nelson and Wendell M. Whitecotton. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 548-552.

Flow sheets and procedures of Midvale, Utah, smelter of U. S. Smelting, Refining and Mining Co., for recovery of copper and zinc.

2c-57. Lead Refined Electrolytically at the East Chicago Plant. E. W. Merrick, F. C. Smyers, and F. L. Warner. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 566-568.

Methods used at plant of U. S. Smelting, Refining and Mining Co.

2c-58. Peculiarities in the Thermal Reduction of Metals Using Silicon. (In Russian.) P. V. Gel'd. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 495-498.

The reduction of a chromite ore containing 53.22% Cr_2O_3, 6.71% SiO_2, 12.26% Mg, 9.71% Al_2O_3, and 14.19% FeO was studied. Roasting losses using crystalline silicon containing 97.85% Si were 2.31%. Methods and apparatus.

2c-59. Rare-Metal Metallurgy; Special Production Methods for the Less Common Elements. W. J. Kroll. *Metal Industry* (London), v. 73, Oct. 1, 1948, p. 263-265; Oct. 8, 1948, p. 283-286; Oct. 15, 1948, p. 307-308, 310; Oct. 22, 1948, p. 323-325.

A review. 68 ref.

2c-60. Antimony Smelting. W. Wendt. *Metal Industry,* v. 73, Oct. 15, 1948, p. 303-305; Oct. 22, 1948, p. 329-330.

Surveys development, in Europe, of the blast-furnace smelting of antimony. A detailed description of an up-to-date installation and of its operation.

2c-61. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XXV. Sydney J. Johnstone. *Industrial Chemist and Chemical Manufacturer,* v. 24, Oct. 1948, p. 685-691.

Tin sources, refining, uses, electrodeposition, and tin compounds and their uses. (To be continued.)

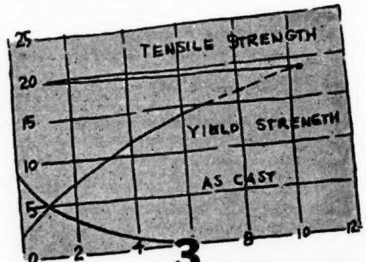
2c-62. Commercial Production of Electrolytic Manganese. C. L. Mantell. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 232-243.

Manufacture of the above by electrowinning in a two-compartment cell with a sulphate electrolyte is described and properties of the pure metal are given. Applications are outlined. 15 ref.

2d—Light Metals

2d-24. Twenty-Five Years' Development of the Soderburg System in Aluminum Furnaces. M. Sem, J. Sejersted, and O. Bockmann. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 220-231.

A new type of electrode with vertical contact studs, direct collection of the furnace gas, and gas burner. These have given excellent results in large furnaces of 60,000 amp. or more, and combine the advantages of both open and closed furnaces.



3 PROPERTIES

3a—General

3a-121. Heat Transfer by Radiation to Surfaces at Low Temperatures. M. Blackman, Alfred Egerton, and E. V. Truter. *Proceedings of the Royal Society,* ser. A, v. 194, Aug. 12, 1948, p. 147-169.

A study of the transfer of heat between the walls of vacuum vessels. The heat transferred from the outer wall at ordinary temperature to the inner vessel at 90° K. is greater than would be expected from the reflectivity of the inner wall, as estimated from its electrical conductivity. The apparent emissivities at 90° K. of Cu, Ag, Au, Sn, brass, Al, steel, and graphite were determined. 28 ref.

(Turn to page 8)

1948). The immersion zinc solution for magnesium contains tetra-sodium-pyrophosphate, zinc sulphate, potassium fluoride, and potassium carbonate. It is operated hot (175 to 185° F.) at a pH of 10.0 to 10.4. This is the pH range of low chemical activity for magnesium. The immersion zinc coating is plated over with copper from a Rochelle salt, copper cyanide bath. The copper-plated magnesium can then be treated as copper for subsequent plating operations.

Magnesium alloys contaning 1% lead or silver have been plated with zinc or nickel from fluoborate solutions (8-116, June 1948).

Applications of aluminum have been extended in recent years by plating. Copper or silver plating is used to facilitate soldering, to provide electrical contacts, or to increase overall surface conductivity; brass plating permits rubber bonding; chromium decreases frictional wear; while copper, nickel, and chromium are used for decoration and protection. The protection of aluminum derived from deposits of these latter three depends on an impervious plate. Thickness of plate necessary to eliminate porosity on aluminum is generally recognized to be 1.5 mils—comparable to that required on zinc or steel.

The success of the zincate process for plating on aluminum depends on the operator. This process is preferred to other methods because of its more general applicability (8-29, 1947; 8-169, 1947).

Two other processes for plating on aluminum involve double plating; copper is the plated metal in one process (8-100, May, 1948) and tin (8-41, April, 1948) in the other. In both methods the first plate is stripped from the aluminum by a mixture of sulphuric and nitric acids. This stripping of the initial deposit removes the deleterious oxide layer. These two processes are reminiscent of earlier reports on the zincate process when the surface was improved by stripping the initial deposit.

Plating on Nonconductors

Uses of plastics and other nonconductors have been enhanced by the fact that surface characteristics can be altered by plating with metals. Metal coatings often have made plastics usable when otherwise the bare plastic would be unfit. The critical operation for plating on nonconductors is the application of a conductive film to the surface. Stuart (8-85, May, 1948) and Edwards (8-154, Aug., 1948) report a preference, in the industry, for colloidal graphite conductive films on plastics.

The formation of metallic films to provide a conducting surface has received considerable attention. Although silver has been widely used, copper films have certain inherent advantages, notably in cost. Wein (7a-175, Sept. 1948) details a practical method for producing copper films on nonconductors.

John G. Beach has been a member of the electrochemical engineering staff at Battelle Memorial Institute since 1942. He is a graduate in chemical engineering from Missouri School of Mines and has had prior experience with Acme White Lead & Color Co.

Electroforming

Electroforming applications have so proved themselves during the past few years that the process has taken its place among the recognized metal fabricating tools. Close cooperation between the designer and the electroformer is expected to widen the field of usefulness still further. The instrument industry, for example, often requires intricate precision parts, possibly of a particular metal, which are difficult to fabricate by conventional methods. The feasibility of producing these by electroforming might be examined profitably.

To acquaint electroplaters with the special devices and techniques practised by the electroformer, Safranek, Dahle and Faust (8-11, Feb., 1948) presented the industrial status of the process, abetted by a literature survey. Ollard (8-11, 8-19, 8-27 and 8-30, 1947) and Orbaugh (8-104, 1947) give an over-all picture of the history, techniques, applications, and materials of electroforming. Blair (8-90, May 1948) describes the Camin Laboratory where over 40,000 small parts are electroformed each week. Kasdan (8-68, May 1948) describes electroforming 500,000 pitot tube assemblies for aircraft in 13 years. It was estimated that 500,000 lb. of copper anodes was used to electroform these assemblies. The standard 60-in. copper reflectors used in Army searchlights since 1933 are manufactured by electroforming (8-69, May 1948).

Die sinking for the plastic and metal die-casting industries is an expensive and time-consuming operation for which electroforming holds promise of simplification. Die sinking is done generally on tool steel and on a concave surface, sometimes difficult to reach. In contrast, electroforming masters can be made from an easily worked plastic or metal, and are made as positives with predominantly convex surfaces. Spiro (8-103, May 1948) discusses the problems involved in electroforming dies and suggests methods of overcoming them. He selected nickel for the electroforms because controlled electroplating of nickel has been well developed. Molybdenum or tungsten electroforms would be of decided interest, but there are no commercial processes for their electrodeposition.

Chromium Plating

Several fundamental studies of chromium plating have provided data and hypotheses which have pointed toward significant advances.

Snavely (8-61, May 1948) identified chromium hydrides in deposits from chromic acid baths. These hydrides were unstable; they decomposed, with shrinkage in volume, to form body-centered cubic metal and hydrogen. It was postulated that commercial hard chromium plates are cracked because of successive deposition and decomposition of hexagonal chromium hydride.

Brenner, Burkhead and Jenning (8-31, March, 1948) studied the physical properties of plated chromium in an attempt to produce a deposit that would have some ductility. They did not succeed in plating ductile chromium, but their data are of fundamental interest. Deposits of low contraction of soft chromium, plated at 185 to 210° F., had physical properties approaching those of annealed chromium. Blum (8-65, 1947) reports the use of soft chromium in gun tubes to minimize erosion.

Tungsten Alloy Plating

Smooth, strong, brittle electroplates of tungsten alloys containing iron, nickel or cobalt have been deposited (8-172, 1947). These alloys were investigated in an attempt to procure characteristics comparable to stellite 21, which is used to make breech liners for gun tubes. Previously plated metals had not shown precipitation hardening and hot hardness. Precipitation hardening was observed for some of these alloys, however; the alloy of 50% W, 50% Fe increased in hardness from 780 Vickers at 600° C. to 1030 Vickers at 800° C. The hardness dropped to 990 Vickers at 1200° C. The maximum tungsten content of the three combinations was 35% with nickel, 50% with cobalt, and 60% with iron. The soundest deposits contained less than these maxima.

Anodes

Anodes have two main tasks in electroplating—to serve as current conductors and to maintain the necessary metal content of the solution as uniform as possible. Important as they are, anodes often do not receive adequate consideration. Thews (8-115, June 1948) has discussed these tasks, with a view to guiding the selection of anodes having chemical and physical properties most suited for the prevailing requirements.

3a-122. Scattering of Ultrasonic Radiation in Polycrystalline Metals. W. Roth. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 901-910.

A method for measuring absorption and velocity of ultrasonic radiation from 5 to 100 Mc. Results of such measurements on polycrystalline Mg and Al show that absorption coefficient varies linearly with frequency and inversely with grain size. Criteria for evaluating the fidelity of pulse transmission in cubic and hexagonal metals, and figures of merit for many such metals. 18 ref.

3a-123. Energy Losses of Sound Waves in Metals Due to Scattering and Diffusion. W. P. Mason and H. J. McSkimin. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 940-946.

Experiments on cubic and hexagonal metals. Two different scattering factors, which depend on anisotropy of the elastic constants, were obtained, one for shear waves and one for longitudinal waves. An approximate formula for diffusion losses was obtained which agrees closely with experimental values.

3a-124. Properties of Chemical Engineering Materials of Construction. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1821-1936.

An extensive tabular compilation of data on metallic and nonmetallic materials. Resistance to corrosion by various atmospheres and chemicals is emphasized; but mechanical, electrical, thermal, optical, and other properties are often also given, as well as manufacturing information. Source of data is indicated in each case. 320 ref.

3a-125. Das Ultrarot-Absorptionsvermögen einiger Metalle bei Zimmertemperatur und −183° C. (The Ability of Several Metals to Absorb Infrared Rays at Room Temperature and at −183° C.) Konrad Weiss. *Annalen der Physik,* ser. 6, v. 2, No. 1-2, 1948, p. 1-18.

Drude's formula for the above was checked by a calorimetric method. Results obtained from Cu and Fe were also compared with those of Mott and Zener, which were obtained by a more recent method. The testing device. 19 ref.

3a-126. Sur l'interprétation des anomalies des ferro-magnétiques aux ondes hertziennes. (An Interpretation of Some Ferromagnetic Anomalies With Respect to Hertzian Waves.) Israel Epelboim. *Comptes Rendus,* v. 227, July 19, 1948, p. 185-187.

Anomalies are interpreted on the basis of the true magnetic structures of the metals without use of supplementary hypotheses indicated in the literature. As a result of the work outlined, a new application of metals in radio has been developed (French patents 551,537; 557,905; 557,906; and foreign patents, 1948).

3a-127. Sur la comparaison du fluage et de la relaxation. (Comparison of Creep and Relaxation.) Pierre Laurent and Michel Eudier. *Comptes Rendus,* v. 227, July 26, 1948, p. 259-261.

A new experimental method, applied at room temperature, for the creep of an Al alloy containing 9.7% Cu. Comparison of results with theoretical ones based on the Bolzmann principle showed satisfactory agreement.

3a-128. Fatigue in Metals; A Critical Survey of Recent Research and Theories. Paul Feltham. *Iron and Steel,* v. 21, Oct. 1948, p. 431-436.

80 references.

3a-129. Permanent Magnet Stability. I. R. J. Studders. *Product Engineering,* v. 19, Nov. 1948, p. 129-133.

Effects of structural change and temperature changes on constancy of flux output. Significance of metallurgical and magnetic stability and Curie temperature. Commercial permanent-magnet compositions.

3a-130. Note on "Statistical Aspects of Fracture Problems". Franklin H. Fowler, Jr. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 1092.

Supplements article by Benjamin Epstein, (v. 19, 1948, p. 140). Some theoretical considerations on the nature of the statistical distribution of specimen strengths. In the "bundle of threads" problem the extension rather than the load is fixed. The strength of the bundle is then fixed by the strength of the strongest strand. The desirability of basing statistical strength on the stress level above which a given percentage of specimens would fail rather than basing it on the mode.

3a-131. Magnetic Materials. G. Fitz-Gerald-Lee. *Electronic Engineering,* v. 20, Nov. 1948, p. 351-353.

Properties of the various types.

3a-132. Contribution of Modern Physics to Metallurgy. Frederick Seitz. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 973-987.

Atomic structure, structure, electrical conductivity of metals, differences between metals and nonmetals, source of metallic cohesion, magnetic properties, migration of atoms in metals, and mechanical properties of metal.

3a-133. Bidwell's Intercept Relation and the Thermal Conductivity of Liquid Metals. R. W. Powell. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 995-996.

The relationship advanced by Bidwell and Hogan (v. 18, 1947, p. 776) for thermal conductivity, density, specific heat, and temperature of Al, Sn, Pb, and Zn does not agree with certain experimental data reported by other authors.

3b—Ferrous

3b-160. Important Physical Characteristics of Steel. Chester M. Inman. *Metals Review,* v. 21, Oct. 1948, p. 19, 21, 23.

Second of three articles. Effects of the various alloying elements and selection of steels for specific applications, the various factors involved being discussed in simple terms.

3b-161. Free Cutting Steels. T. C. Du Mond. *Materials & Methods,* v. 28, Oct. 1948, p. 95-102.

Why certain steels are free cutting. The various grades of free-cutting steels, their cutting, joining, heat treatment, and uses.

3b-162. Thermal Resistance of Metal Contacts. W. B. Kouwenhoven and J. H. Potter. *Welding Journal,* v. 27, Oct. 1948, p. 515s-520s.

Thermal resistance of steel-to-steel joints. Effects of pressure, temperature, and surface roughness were explored. An approximate method was developed to estimate the effect of area increase under load. Thermal resistance results are reported at two temperature levels for pressures from 195 to 2955 psi. Tests were also made at constant pressures and varying temperatures. 13 ref.

3b-163. Iron, Mild Steels, and Low Alloy Steels. R. B. Mears and S. C. Snyder. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1798-1800.

Recently published information which is believed to be of interest to chemical engineers. 30 ref.

3b-164. Stainless Steels and Other Ferrous Alloys. M. H. Brown and W. B. DeLong. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1812-1820.

Reviews literature of the past year under the following headings: passivity and corrosion resistance, structure and mechanical properties, welding, general, high-silicon irons, Ni-Fe alloys, and austenitic Mn steels. 232 ref.

3b-165. Shaft Guide Reactions. J. L. Kerry and H. Hitchen. *Colliery Guardian,* v. 177, Oct. 1, 1948, p. 437-442.

Causes of wire-rope failure. Effects of various designs of guides and pulleys. Results of fatigue tests; inception of cracks and plastic deformation.

3b-166. Anomalous Magnetic Behavior of Nickel-Iron at High Frequencies. A. Wieberdink and R. Kronig. *Nature,* v. 162, Oct. 2, 1948, p. 527-528.

Results of experiments on two concentric Lecher systems, one consisting of a copper wire within a concentric copper conductor and the other a Ni-Fe wire within the same outer conductor. Both systems were coupled to an oscillator and wave lengths of standing waves measured. In a narrow interval, wave lengths on the Ni-Fe wire were considerably larger than those on the copper wire, indicating values of permeability less than unity or even negative.

3b-167. New Steel Features High Strength and High Toughness. Peter Payson and A. E. Nehrenberg. *Iron Age,* v. 162, Oct. 21, 1948, p. 64-71; Oct. 28, 1948, p. 74-80, 152, 154.

A new steel called "HY-Tuf", contains Ni, Mn, Si, and Mo, and possesses low notch sensitivity at relatively high hardness. Notch-impact, notch-tensile, and notch-fatigue properties of this steel are compared with construction steels. Influence of testing and tempering temperatures on mechanical properties. The second installment gives hardenability and data on the properties of the steel treated in sections up to 4-in. round. Microstructures in the hardened and annealed conditions. 16 ref.

3b-168. Stainless Steels—Their Characteristics. James J. Heger. *Steel,* v. 123, Oct. 25, 1948, p. 71-75, 90, 92, 94.

Properties and structures of various stainless-steel compositions.

3b-169. Cold Rolled Low Carbon Sheets vs. Enamel Iron for High Temperature Enamels. Don Beal. *Finish,* v. 5, Nov. 1948, p. 25-28.

Basic differences between the two types, the production of special-analysis steel.

3b-170. High-Silicon Cast Irons Resist High Temperatures. W. H. White and A. R. Elsea. *Foundry,* v. 76, Nov. 1948, p. 68-69, 230.

Investigation was undertaken to verify the claims made for elevated-temperature applications of high-Si cast irons, to develop a technique for their economical production and to improve their characteristics for specific purposes.

3b-171. Plasticity of Steel During Deformation Under Tension and Torsion. (In Russian.) M. V. Vakutovics and F. P. Rybalko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 11, 1948, p. 279-280.

It is shown that the plasticity of polycrystalline materials depends to a great extent on the type of test. Maximum slip under tension is much greater than that under torsion. This fact is believed to be due to irregularities in distribution of deformation along the cylindrical test specimens.

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A.S.M. Annual Meeting

Reports of the President, Secretary and Treasurer; Business Transacted

THE ANNUAL MEETING of the American Society for Metals was held in Philadelphia on Wednesday morning, Oct. 27, during the National Metal Congress and Exposition. Annual reports of the president, treasurer and secretary were presented, and are reproduced in summary below. They will be published in full in the next volume of the A.S.M. *Transactions.*

A change in the Constitution and Bylaws of the Society was affirmatively voted. This change concerns distribution of A.S.M. publications; it was reported in full in the July 1948 issue of *Metals Review.*

President Foley then presented the slate of new officers nominated last May (see *Metals Review,* June 1948). No additional nominations having been received, the secretary cast the unanimous vote of the members for these candidates.

PRESIDENT'S REPORT

Presented by Francis B. Foley

Superintendent of Research
Midvale Co.
Retiring A.S.M. President

The first portion of Mr. Foley's report outlined the 75-year history of alloy constructional steels, which was the basis of the "Salute to Alloy Steel", theme of the 30th National Metal Congress and Exposition. He then continued as follows.

It has been stated that more metal has been produced during the past 40 years than during all previous recorded time. This, of course, means that during its 30 years of existence, your Society has played an active part in that astonishing feat. . . . .

That there was a need for such an organization as ours is amply shown by its phenomenal growth. The past year has seen the addition of the Utah Chapter in Salt Lake City, increasing the A.S.M. family to 76 chapters. Of these chapters it has been the pleasant duty of the president to visit some 40 during the past year. . .

Not the least, by any means, of the educational activities of the Society is the issuance from time to time of the Metals Handbook. The volume issued during the past year . . . is an encyclopaedia of metallurgical information. Never before has there been so much authoritative metallurgical data placed between two covers.

It is not practical here to record individually the names of all who, by serving on the many subcommittees of the Handbook, have made this publication possible. The Society as a whole is deeply indebted to them. Opportunity is taken, however, to record the work of George V. Luerssen of the Carpenter Steel Co., chairman of the Handbook Committee, and of Taylor Lyman, its editor.

Another contribution by the Society to progress in metallurgical education during the year was the issuance of the brochure "Your Career in the Metallurgical Profession" by the Committee on Education. This booklet, under the authorship of John W. W. Sullivan, was written for the guidance of high school and preparatory school students and was distributed to schools throughout the nation.

Last year an innovation was tried in the form of sessions on Saturday and Sunday, immediately preceding the opening of the Metal Congress and Exposition. These sessions were devoted to the purely scientific appraisal of the behavior of metals in the solid state. The resulting papers and discussions were published by the Society as part of its *Transactions.* The venture proved such a success that it has been repeated this year with very gratifying results. . . . .

The dedication in August of the Sauveur Memorial Room at headquarters was an interesting event of the year. This room serves not only to commemorate the work of Dr. Sauveur, but will remain as an inspiration to those engaged in the profession in which he was engaged so long and so brilliantly . . .

It is with deep regret that we record the death during the past year of William Phillips, a past president of the Society, and of Charles Y. Clayton, a former trustee. . . .

The Board of Trustees held four meetings during the year, on Oct. 24, 1947, April 30, Aug. 20, and Oct. 26, 1948.

SECRETARY'S REPORT

Presented by William H. Eisenman

Secretary
American Society for Metals

The American Society for Metals, on Oct. 1, 1948, had a total membership of 20,037. Of this number 17,324 or 86.5% were of the member classification; 1650 or 8.2% were sustaining members; 1030 or 5.1% were junior members. There were 32 honorary and founder members.

Transactions—Volume 40 of the *Transactions* was published and distributed to the membership in April 1948. This volume totals 1164 pages and contains 42 articles with their discussions. It contains all of the papers presented at the October 1947 convention, together with other interim papers received during the year.

Metal Progress—A tabulation of total editorial and advertising pages published annually in *Metal Progress* for the past eight years... indicates the peak in advertising patronage during 1944, 1945 and 1946. . . The number of editorial pages has for years been fairly close to 650. . .

The most pronounced effect on the balance sheet, however, has been the large increase in costs of typesetting, engravings and printing that went into effect at the turn of the year, and a steady increase in paper costs. For example, in 1943, the necessary paper cost \$36,000; last year it cost \$54,000. In 1943 the printer's and engraver's bills came to \$71,000; last year they amounted to \$109,000. Nevertheless, the Board of Trustees is resolved that the quality and coverage of *Metal Progress* must be maintained—indeed, improved. . .

Metals Review — The biggest improvement made in *Metals Review* during the past 12 months was the adoption of smooth coated stock instead of the rough newsprint heretofore used. The consequent improvement in legibility, appearance and durability excited many favorable comments from readers. . .

The Review of Current Metal Literature continues to expand, and now runs to some 800 articles listed and annotated per month. This expansion is largely in the field of foreign literature. . . . *Metals Review* continues to carry two feature articles in a specific field each month—one surveying the literature in that field published during a certain period, and the other describing new products and equipment introduced by the manufacturers in the same field. . . . The number of reports of chapter meetings published during the past 12 months totaled 333—an increase of 20% over the corresponding period last year . . .

The Bibliography of Metallurgical Books, published serially beginning with the March 1948 issue, will be completed in the November issue, and will then be reprinted in the form of a separate pamphlet accompanied by author index.

Metals Handbook—The 1948 edition of the Metals Handbook, published June 16, 1948, is a thorough revision and substantial enlargement of the 1939 edition; it is almost 40% larger. In the present edition, 68 subcommittees and 603 individuals are named as contributors. . .

Books—During the past fiscal year, 17,560 technical books published by the Society have been sold . . . . Six new titles were added to the publication list, namely:

A.S.M. Review of Metal Literature, Vol. 4; 1948 A.S.M. Metals Handbook; Copper and Copper Alloys, by Owen W. Ellis; Fracturing of Metals, by 21 different authors; Chapter Know-How, by W. H. Eisenman; Your Career in the Metallurgical Profession, by John W. W. Sullivan.

The following titles are now in process of preparation:

Physical Metallurgy of Aluminum, by five authors; Sleeve Bearing Materials, by 19 authors; Metallurgy and

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3b-172. Variation de la vitesse de cémentation du fer a la températura du point de Curie. (Variation in the Rate of Sintering of Iron in the Neighborhood of the Curie Point.) Hubert Forestier and Georges Nury. *Comptes Rendus,* v. 227, July 26, 1948, p. 280-282.

The chemical activity of the ferromagnetic oxides was investigated in the neighborhood of the Curie point. A maximum for this activity and its influence on the hardness of iron. Experimental data confirming the theoretical deductions.

3b-173. Fatigue Testing of Spring Steel and the Influence of Surface Defects on the Data Obtained. (In Russian.) L. I. Kukanov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 977-984.

Data from fatigue tests on the above test specimens indicate the influence of surface defects on fatigue strength. Surface treatment, such as sandblasting, shot peening, and polishing, does not always result in the expected improvement of fatigue strength.

3b-174. Fatigue Tests on Crankshaft Steels; Nitriding Effects and Tests on Ni-Cr-Mo and Cr-Mo-V Material. *Automobile Engineer,* v. 38, Oct. 1948, p. 384. Based on paper by P. H. Frith.

3b-175. Properties of Type "CA" Cast Alloys. E. A. Schoefer. *Alloy Casting* Bulletin, Oct. 1948, p. 1-7.

Effects of composition and heat treatment on the mechanical and corrosion resistant properties of cast 12% Cr alloys. Based on research for Alloy Castings Institute by Battelle Memorial Institute.

3b-176. A Guide to Tool Steel Selection. Harold Chambers. *Tool Engineer,* v. 21, Nov. 1948, p. 18-19.

Compositions and hardnesses of the various types.

3b-177. Low-Temperature Properties of 18:8 Steel. *Technical News Bulletin* (National Bureau of Standards), v. 32, Nov. 1948, p. 129-132.

Results obtained by investigation over the past several years. Stress-strain curves and stress-temperature curves for annealed and cold drawn 18-8.

3b-178. Relationship of Section Size, Hardness, and Composition of Gray Cast Iron. R. G. McElwee. *SAE Journal,* v. 56, Nov. 1948, p. 33-35.

Previously abstracted from *American Foundryman,* v. 14, Aug. 1948, p. 46-49. See item 3b-118, 1948.

3b-179. High-Silicon Cast Iron—for High Temperature Service. W. H. White and A. R. Elsea. *Iron Age,* v. 162, Nov. 4, 1948, p. 106-108.

Previously abstracted from *Foundry,* v. 76, Nov. 1948, p. 68-69, 230. See item 3b-170, 1948.

3b-180. Steels and Their Treatment. Part I. Selection. Part II. Conditioning Processes. Norman N. Brown. *Machine Design,* v. 20, Oct. 1948, p. 87-92, 152, 154; Nov. 1948, p. 110-116, 190, 192.

Some of the available steels and their treament, to aid the designer in selecting the most desirable steel and in specifying its subsequent heat treatment. Various heat-treating processes.

3b-181. Fundamentals of Forging Practice. XI and XII. Waldemar Naujoks. *Steel,* v. 123, Oct. 25, 1948, p. 78, 80, 82, 84, 87; Nov 8, 1948, p. 96-100, 126, 129.

Part XI describes uses and properties of the various A.I.S.I. forging steels. Part XII deals with design of parts to be produced by forging. Clarified by simple drawings. (To be continued.)

3b-182. Nodular Cast Irons. H. Morrogh and J. W. Grant. *Foundry,* v. 76, Nov. 1948, p. 90-95, 170, 172, 174, 176, 178, 180, 182, 184-185, 188.

Previously abstracted from *Foundry Trade Journal,* v. 85, July 8, 1948, p. 27-34; July 15, 1948, p. 51-57; July 22, 1948, p. 81-86; July 29, 1948, p. 105-110. (To be concluded.) See item 4b-54. 1948.

3b-183. Some 1000 F. Steam-Pipe Materials. Ernest L. Robinson. *Transaction of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 855-860; discussion, p. 860-865.

Previously abstracted from *American Society for Mechanical Engineers, Advance Paper* 47-A-74, 1947. See item 3b-154, 1948.

3b-184. A Study of the Properties of 0.5 Per Cent Chromium—0.5 Per Cent Molybdenum Pipe Steel. R. C. Fitzgerald, A. B. Wilder, G. V. Smith, and A. E. White. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 867-877.

Previously abstracted from *Welding Journal,* v. 27, Sept. 1948, p. 457s-469s. See item 3b-144, 1948,

3b-185. The Structural Stability of Several Cast Low-Alloy Steels at Elevated Temperatures. V. T. Malcolm and S. Low. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 879-883; discussion, p. 883-884.

Effects of furnace practice on a cast C-Mo-V steel, and of Al, Cr, V, Cu, Ti, Ni, and high Mo on cast C-Mo steel, singly and in various combinations. Results of McQuaid-Ehn, tensile, Jominy hardenability, creep, and weldability tests. Structural stability after various aging cycles. Effect of aging at elevated temperature on static bend bars and V-notch Charpy bars.

3c—Nonferrous

3c-96. The Intermediate State of Superconductors. I. Magnetization of Superconducting Cylinders in Transverse Magnetic Fields. M. Désirant and D. Shoenberg. **II. The Resistance of Cylindrical Superconductors in Transverse Magnetic Fields. III. Theory of Behavior of Superconducting Cylinders in Transverse Magnetic Fields.** E. R. Andrew. *Proceedings of the Royal Society,* ser. A, v. 194, July 28, 1948, p. 63-112.

Experimental data for tin and mercury cylinders, together with a theoretical analysis of the results and correlation with the work of Landau. 40 ref.

3c-97. The Magnetic Properties of Ordered Nickel-Manganese Alloys. Robert I. Jaffee. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 867-870.

Ni-Mn alloys in the form of Rowland rings containing 20.1%, 21.4%, and 25.3% Mn were put into an ordered condition by very slow cooling to 380° C., and long annealing at that temperature. Magnetization curves and hysteresis loops at room temperature showed that the 21.4%-Mn alloys was very soft magnetically, while the 25.3%-alloy was relatively hard. The 20.1% alloy was magnetically soft, but not so soft as the 21.4%.

3c-98. The Bridge Erosion of Electrical Contacts. Part I. J. J. Lander and L. H. Germer. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 910-928.

Bridge erosion is the transfer of metal from one electrode to the other when an electric current is broken in a low-voltage circuit which is essentially purely resistive. It is associated with the bridge of molten metal formed between the electrodes as they are pulled apart, and more specifically with the ultimate boiling of some of the metal before the contact is finally broken. Results of fundamental studies of this bridge and of empirical measurements of the transfer of metal. 12 ref.

3c-99. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1785-1788.

Information published during the past year on mechanical and fabrication properties and corrosion resistance of these alloys. 55 ref.

3c-100. Nickel and High Nickel Alloys. W. Z. Friend. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1801-1804.

Summary is, for the most part, confined to a consideration of Ni and Ni-base alloys containing more than 50% Ni. Some attention also is given to Co-Ni base alloys. New alloys, fabrication procedures, properties, and applications. 83 ref.

3c-101. A New Nimonic Blade Material. *Aeroplane,* v. 75, Oct. 8, 1948, p. 481-482.

Tensile and creep-test results for Nimonic 80A, a new turbine-blade material developed in Britain. Other properties.

3c-102. Ottoni al nichel-berillio. (Brass Containing Nickel and Beryllium). G. Venturello and M. Bosio. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 49-53.

A brass containing 76.74% Cu, 6.58% Ni, and 1.87% Be (maximum amounts) was studied from the points of view of crystal structure, mechanical properties, and corrosion resistance. Optimum conditions for heat treatment of such alloys.

3c-103. Dependence of the Magnetic Permeability of Alloys of the Permalloy Type on Frequency. (In Russian.) K. A. Goronina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 459-462.

Investigation, using a Permalloy wire. Results indicate the complex character of permeability and the presence of dispersion. The dependence of permeability on frequency in the presence of a constant magnetic field along the wire. 10 ref.

3c-104. Der Thomson-Koeffizient einiger Metalle bei hohen Temperaturen. (The Thomson Coefficient of Several Metals at High Temperatures.) G. J. Ekkers, A. Farner, and R. Kläui. *Helvetica Physica Acta,* v. 21, Aug. 10, 1948, p. 218-219.

Method, and the results, of measuring the Thomson coefficients of W, Mo, and Pt from 900 to 2700° K.

3c-105. Polarization and Adsorption Phenomena on Electrodes. (In Russian.) M. Loshkarev and A. Kryukova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 97-100.

The influence of B-naphthol, thymol and diphenylamine. Polarization curves are presented for Ag, Bi, Cd, Cu, Pb, Sn, Tl, and Zn. The results are interpreted.

3c-106. Possible Hazards Due to Cadmium-Coated Pipe and Fittings. Leo V. Garrity. *Journal, American Water Works Association,* v. 40, Nov. 1948, p. 1194-1196.

Possibility of poisoning when used in the water-supply system. Sufficient information is not available for a conclusion.

3d—Light Metals

3d-60. "Diffuse Scattering" of the Fermi Electrons in Monovalent Metals in Relation to Their Electrical Resistivities. A. B. Bhatia and K. S. Krishnan. *Proceedings of the Royal*

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ANNUAL MEETING

Magnetism, by J. K. Stanley; Properties of Metals in Materials Engineering, by eight authors; Grain Control in Industrial Metallurgy, by four authors; Symposium on Mechanical Wear (presented at Massachusetts Institute of Technology).

The Publications Committee (A. O. Schaefer, chairman) . . . reviewed 51 papers of which 44 were approved for preprinting and presentation at this convention; . . . . The committee held one formal meeting on June 15 and 16, 1948. . .

Preprints—The 44 papers being presented at this convention were prepared in preprint form and distributed to those members of the society who requested them, a total of 45,000 copies being distributed free to the membership.

The Educational Committee (C. R. Austin, chairman) . . . held one formal meeting on Nov. 18, 1947, at which time the three educational lecture courses for the 1948 convention were selected and planned. Subjects of the courses are "Properties of Metals in Materials Engineering", by eight authors; "Metallurgy and Magnetism", by J. K. Stanley; and "Grain Control in Industrial Metallurgy", by four authors.

The Seminar Committee (John Chipman, chairman) . . . has been responsible for the selection of the subject, "Cold Working of Metals", presented during five sessions last Saturday and Sunday. The responsibility for correlating the program rested with M. Gensamer and J. H. Hollomon. . . The seminar marks such a successful two-day meeting that the continuance of this activity is a foregone conclusion.

Education by Radio — With the broadening of the articles of incorporation of the Society, which was unanimously adopted at the annual meeting in Chicago last year, the Board of Trustees petitioned the Federal Communications Commission for a license to establish an FM radio station for the purpose of advancing the educational facilities of the Society as well as to establish the A.S.M. as a science service organization whose technical and educational programs would be available for distribution and use to the 4000 other FM and AM stations in the United States and Canada.

We are pleased to announce that the Federal Communications Commission has granted the application for the allocation of an FM channel and the Society only awaits the completion by the Federal Communications Commission of the examination and approval of the engineering features of the station so that a constructional permit will be granted.

Metal Congress—It is almost an axiom that each year it is my privilege to report another successful National Metal Congress and Exposition . . . The exhibitors participating in this year's show have presented displays that have aroused enthusiastic comments. . .

The central theme of the congress has been "A Salute to Alloy Steel", and the Society . . . acknowledges its gratitude to the Committee on the Visualization of 75 Years of Progress in Alloy Steel and to its chairman, Robert A. Wheeler, for presenting on the stage of Convention Hall a remarkable dramatization of the progress of this great engineering material. The Society also appreciates the conscientious and careful work of the Committee on Awards of the Salute to Alloy Steel, under the able leadership of J. M. Schlendorf. . .

The A.S.M. is pleased to have sponsored this salute, because among its 20,000 members the Society represents *all* the producers and *most* of the consumers of alloy steel. At the same time it may be stated that the principal progress and development in alloy steels have paralleled the progress and development of the Society.

The A.S.M. hopes to continue to serve the metal industry in the future as it has in the past.

What Others Say About

National Metal Congress

The following excerpt is from an editorial in the November first issue of *Steel* entitled "Americana"

"Had it been possible for Joseph Stalin and other members of the Politburo to have been visiting in the United States last week, they could have observed the operation of two typically American institutions—the American presidental campaign and the American annual convention and exposition. . . .

"If the Stalin party had gone to Philadelphia, its members would have seen the American annual convention and exposition in its highest state of development. They would have been impressed by the potential represented by the display of materials and equipment at the exposition and by the technological progress reflected in papers presented at meetings of the American Society for Metals American Welding Society, Institute of Metals Division of A.I.M.E., and Society for Non-Destructive Testing. They likewise would have been impressed by the 'Salute to Alloy Steel' and by the presentation of distinguished service awards to men who have made outstanding contributions to the development of alloy steels.

"Most important, they would have perceived in activities of the 30th National Metal Congress and Exposition a unity of purpose among thousands of professional, operating and management men to help make this a better world in which to live. Members of the Politburo would have had no difficulty whatever in recognizing this unity as a sign of tremendous national strength. They would respect it highly. . . ."

TREASURER'S REPORT

Presented by E. L. Spanagel

Engineer, Industrial Department
Rochester Gas and Electric Corp.
Treasurer, A.S.M.

This report covers the Society's fiscal year ended Aug. 31, 1948. This has been a rather unusual year in that the gain in income over expense was at the lowest level since 1940. It should be evident, however, that this situation has been occasioned by the completion and distribution of the 1948 Metals Handbook. A total of $230,000 has been expended on the publication of the new Handbook over the past four years, and $132,500 of this total was spent within the past fiscal year. . . The statement of total income and expense for the past year is as follows:

Income	$914,395.67
Expense	865,238.50
Excess	$ 49,157.17

Gross income from membership dues amounted to $220,937.31, of which amount $90,519.37 was returned to the chapters, both all-time high figures...

Income from *Metal Progress* decreased 11.5% this year as compared to the prior year, whereas the expense of publishing *Metal Progress* decreased only 3%. . .In spite of these decreases, however, income from *Metal Progress* represented about 36% of the total income of the Society . . .

Transactions and *Metals Review* are, of course, not self-sustaining and cost the Society net sums of approximately $23,400 and $36,100 respectively.

Sales of books published . . . netted approximately $16,000.

During the past year new members have been assessed $5 in addition to the regular membership dues for the first year, to defray partially the cost of the new Metals Handbook. These moneys, amounting to $18,777.50, have been set aside in a special reserve for Metals Handbook, which has been established to provide for the cost of printing additional editions and eventual revision. . .

Also the security holdings of the Society were increased by $101,720. This increase is represented by new holdings of $70,000 par value United States Government bonds and some $31,000 worth of common stock holdings. . . . As of Aug. 31, 1948, the Society's investments had a market value of approximately $1,356,800. Interest and dividends earned on these investments amounted to $47,141.58, or 3.6%.

The Society's assets include real estate represented by the national headquarters at $63,939, inventories in books, furniture and equipment totaling $155,700, and cash on deposit amounting to $119,598.

At the end of the 1947-48 fiscal year, the total assets of the local chapters amounted to approximately $188,000, an increase of about $9000 over the previous year. This substantial reserve constitutes a definite guarantee of continued service, activity and progress in the various local chapters.

Society, ser. A, v. 194, Aug. 12, 1948, p. 185-205.

The scattering coefficient depends on two factors: the atom-form factor for scattering and the structure factor of the crystal. Using data for these factors, the mean free path of the Fermi electrons is calculated for different directions of incidence, for one typical monovalent metal, namely, sodium. 23 ref.

3d-61. Plastic Flow Characteristics of Aluminum-Alloy Plate. L. J. Klingler and G. Sachs. *Journal of the Aeronautical Sciences*, v. 15, Oct. 1948, p. 599-604.

Commercial hot-rolled 1½-in. 24 ST aluminum plate possesses a marked degree of crystallographic anistropy. Tensile tests at various orientations showed that the yield strength is only slightly dependent upon the anistropy. 17 ref.

3d-62. Uber aushärtbare Aluminiumlegierungen mit Zink, Magnesium und Kupfer. (Heat Treatable Aluminum Alloyed With Zinc, Magnesium, and Copper.) K. L. Dreyer and H. J. Seemann. *Metall*, Jan. 1948, p. 6-11.

A heat treatable Al alloy with an average composition of 4.5% Zn, 1.5% Mg, 1.6% Cu, and 0.7% Mn shares in many respects the properties of duralumin. The proposed alloy has been tested for bending and tensile strength, elongation, and yield point.

3d-63. Influenza del vanadio sulle caratteristiche dell 'alluminio per uso elettrico. (Influence of Vanadium Additions on the Properties of Aluminum for Electrical Uses.) C. Panseri and M. Monticelli. *Alluminio*, v. 17, July-Aug. 1948, p. 335-338.

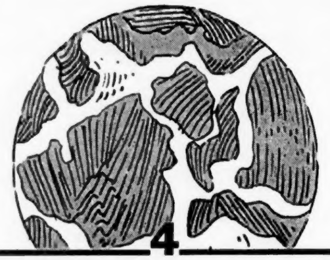
Confirms by experimental investigations that an increase in the content of vanadium increases markedly the electrical resistance of aluminum without influencing its mechanical properties.

3d-64. Coefficiente di temperatura della resistenza elettrica dell 'alluminio e delle sue leghe. (Temperature Coefficient of Electrical Resistance of Aluminum and Its Alloys.) F. Rohner. *Alluminio*, v. 17, July-Aug. 1948, p. 339-341.

Derives, on the basis of experimental results on pure aluminum and a series of its alloys, an empirical relationship.

For additional annotations indexed in other sections, see:

4b-90; 6c-40; 9a-92; 9b-56; 14d-56; 19b-148; 27a-152.



4 CONSTITUTION and STRUCTURE

4a—General

4a-51. A New Interpretation of Interstitial Compounds—Metallic Carbides, Nitrides and Oxides of Composition MX. (In English.) R. E. Rundle. *Acta Crystallographica*, v. 1, Sept. 1948, p. 180-187.

Interstitial monocarbides, mononitrides, and a few monoxides tend to have the sodium chloride structure irrespective of metal structure and radius. Interstitial phases are regarded as electron-deficient structures, where the nonmetal forms more bonds than it has bond orbitals. The concept of half-bonds is used to explain the structure, hardness, brittleness, conductivity, and high melting points of interstitial phases. 18 ref.

4a-52. The Electronic Structure of Solids. E. E. Schneider. *Science Progress*, v. 36, Oct. 1948, p. 614-632.

Theories presented under the headings: solids and atoms; the band theory of solids; cohesive forces and solid types; Fermi-Dirac statistics and metallic conduction; electron transfer effects; Hall effect and positive holes; periodic table and solid types; semiconductors; and color centers in alkali halides and impurity phosphors. 16 ref.

4a-53. Gas et Métaux. (Gases and Metals). Henry Lepp. *Le Vide*, v. 3, May 1948. p. 433-441.

The phenomena of absorption and adsorption of gas by metals from the physicochemical point of view. Different gas-metal systems were investigated by thermodynamic analysis in order to solve problems connected with their application in vacuum technique. 12 ref.

4a-54. Study of the Displacement of Suspended Additions During Crystallization. (In Russian.) I. N. Fridlyander and N. A. Vysotskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 71-73.

The senior author, in 1946, proposed a theory according to which the smaller size of metallic grains produced by more rapid rates of cooling is closely connected with the interactions of the crystals with any admixtures present. Such admixtures exert a mechanical pressure during crystallization which causes inhomogeneity of the resulting solid. An apparatus developed to measure this pressure and results of its application to an oxalic acid solution.

4b—Ferrous

4b-88. The Nature of the Bonds in the Iron Silicide FeSi and Related Crystals. (In English.) L. Pauling and A. M. Soldate. *Acta Crystallographica*, v. 1, Sept. 1948, p. 212-216.

FeSi was reinvestigated by X-ray photography of single crystals, and the reported structure for the substance verified. The structure and the interatomic distances. It is shown that the interatomic distances are compatible with those found for elementary Fe and Si.

4b-89. Atomic Displacements in the Austenite-Martensite Transformation. (In English.) M. A. Jaswon and J. A. Wheeler. *Acta Crystallographica*, v. 1, Sept. 1948, p. 216-224.

It is shown that the tetragonality of martensite is necessary if it is assumed that the iron and carbon-atom displacements constitute a common homogeneous deformation. An explanation of the observed high indices of the habit plane of martensite of certain carbon contents is advanced.

4b-90. Constitution et propriétés de quelques alliages fer-carbone-glucinium a plus de 3% de carbone. (Constitution and Properties of Several Iron-Carbon-Beryllium Alloys Containing More Than 3% Carbon.) Marcel Ballay. *Revue de Métallurgie*, v. 45, July 1948, p. 231-238.

Particular emphasis on crystal structure and mechanical properties. Optimum conditions for heat treatment of 13 alloys with beryllium contents between 0 and 3.88%.

4b-91. Classification of Solubility of Elements in Iron. III. Intermediate Solid Solutions of Iron. (In Russian.) I. I. Kornilov. *Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*. (Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences), July-Aug. 1948, p. 369-376.

Isolates a group of elements with atomic diameters differing from that of iron by 8 to 15% which form binary intermediate solid solutions with iron. A method of systemization of ternary, quaternary, and more complicated intermediate solid solutions of ferrite is proposed on the basis of such elements and the number of possible systems is computed. Hypothetical two and three-dimensional diagrams.

4b-92. Het T.T.T. Diagram. (The T.T.T. Diagram). F. van Wijk. *Metalen*, v. 2, Aug. 1948, p. 253-258.

Principles of the isothermal austenite transformation. Some illustrative transformation-temperature-time diagrams are given. The effects of the common alloying elements in steel on the above transformation are briefly mentioned.

4b-93. Further Investigation on the Graphitization of Piping for the EEI and AEIC. A. M. Hall and S. L. Hoyt. *Transactions of the American Society of Mechanical Engineers*, v. 70, Nov. 1948, p. 847-853; discussion, p. 853.

C-Mo, Cr-Mo, and V-Mo compositions were tested at 1125° F. An effort was made to relate plastic deformation with graphitization on a laboratory basis. The high resistance of Cr-Mo steels was confirmed and further information was obtained on the existence of an incubation period in the graphitization process.

4c—Nonferrous

4c-75. On the Crystal Structure of Silicon Carbide and its Content of Impurities. (In English.) Dick Lundquist. *Acta Chemica Scandinavica*, v. 2, no. 2, 1948, p. 177-191.

In connection with a general investigation of the properties of silicon carbide, extensive X-ray studies and spectrochemical analyses were conducted. The material was also studied by densitometric and microscopical methods. 12 ref.

(Turn to page 14)

COMPLIMENTS

To GEORGE N. SIEGER, president of the S-M-S Corp., on his election as president of the American Welding Society. Also to O. B. J. FRASER, assistant manager, research and development division, International Nickel Co., on his election as first vice-president, and to G. E. CLAUSSEN, metallurgist, Reid-Avery Co., on his election as vice-president of district No. 2 of the A.W.S.

♦ ♦ ♦

To JOHN J. CHYLE, director of welding research, A. O. Smith Corp., and H. N. SIMMS, head of the metallurgical department of Black, Sivalls & Bryson, Inc., on their election as directors of the American Welding Society.

♦ ♦ ♦

To GILBERT E. DOAN, head, department of metallurgical engineering, Lehigh University, on the award of the War-Navy Certificate of Appreciation.

To CAPT. CHESLEY MCA. EVANS, president of Chicago Steel Foundry Co., on his appointment by the U. S. Navy to direct and coordinate the training program for the reserve fleet.

♦ ♦ ♦

To E. PAUL DEGARMO, associate professor of mechanical engineering, University of California, on the award of the Lincoln Gold Medal of the American Welding Society for the outstanding paper of the year on welding.

♦ ♦ ♦

To ARTHUR E. HAGEBOECK, executive vice-president, Frank Foundries, Inc., on the receipt of the first gold medal award of the Gray Iron Founders' Society "for his outstanding contributions to the general welfare of the industry and his brilliant accomplishment in establishing foundry cost groups throughout the country."

Subscription Offered For Clipping Purposes At Reduced Rate

Starting with the January 1949 issue, *Metals Review* will print the A.S.M. Review of Current Metal Literature on consecutive pages, using both sides of the sheet. This change in format is necessitated by the fact that this continually expanding feature requires more single pages than are available in one issue.

To accommodate those who wish to clip and file individual annotations or sections, a second subscription is offered at the nominal cost of $2.00 per year.

The $2.00 rate is available to A.S.M. members who already receive *Metals Review* on their memberships and who wish to have a second copy for clipping purposes.

The Reviewing Stand

"CURIOUSER AND curiouser," said Alice, as she wandered through the maze of scientific literature search problems and came upon an oddity issued by a governmental agency and known as *Prevention of Deterioration Abstracts*. "What in the world will they abstract next?"

[It was a purely academic question addressed to the Mad Hatter, who by that time was quite lost in the section devoted to *Electrical Engineering Abstracts* where he had his feet all tangled up among the decimal points of the expression 621.314.21.062 = 3. This astronomical figure was supposed to mean that the abstract so designated had to do with methods of connection of three-phase transformers—in German!]

"Well, at any rate," said Alice to herself, *everyone* ought to be interested in prevention of deterioration. *I* certainly feel deteriorated since I got into this thing." So she turned down the pathway where the arrow pointed and discovered that these abstracts were classified under the following headings:

Biological agents; electrical and electronic equipment; fungicides and other toxic compounds; lacquers, paints and varnishes; leather; lubricants; metals (ah! there we are); miscellaneous; optical instruments and photographic equipment; packaging and storage; plastics, resins, rubbers, and waxes; textiles and cordage; wood and paper.

Material for the abstracts is obtained from journal articles, patents, and unpublished reports from government, university, and industrial research groups both here and abroad, Alice learned.

Approximately 2000 pages are published a year, in two volumes of six issues each. The yearly subscription rate, which includes two sturdy binders and index guides, is currently $37.50. The rate will be $50 for requests received after July 1, 1949. It is published by the National Research Council of the National Academy of Sciences (Prevention of Deterioration Center, Room 204), 2101 Constitution Ave., Washington 25, D.C.

There is no moral to this story*, but at least we've discharged our obligation to the Government and told you how to keep from deteriorating.

To Make the Day Brighter

We thought that all of the superlatives about the recent National Metal Congress in Philadelphia had been exhausted until we came across the report prepared by an undergraduate student in metallurgical engineering. To quote:

"This convention made me feel very proud that I am studying metallurgy. One has no idea what a tremendous morale-boosting effect a convention such as this has upon the student. Here one can see the fruits of knowledge obtained by learning, and one feels that some day he may take an actual part in working for humanity through the field of metallurgy. . . .

"Going to school may seem like a cut-and-dried affair, but when one has the opportunity to see what he is working for (as we did at the convention), he can't help but work harder and take more interest in his field."

M. R. H.

*Except that you can get the A.S.M. Review of Current Metal Literature for $5.00 (price of an annual subscription to *Metals Review*).

4c-76. Twinning in Tetragonal Alloys of Copper and Manganese. Francis T. Worrell. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 929-933.

Studies were made of an 88%-Mn, 12%-Cu alloy. This alloy, when annealed at 925° C. and quenched to room temperature, has a tetragonal structure of axial ratio 0.97 which shows twinning along the 101 and 011 planes.

4c-77. Effect of Gases on Tin Bronze. Clyde L. Frear. *Foundry,* v. 76, Nov. 1948, p. 70-71, 142, 145-146.

Causes and effects of gas evolution in production of tin bronze. (To be concluded.)

4d—Light Metals

4d-41. The Constitution of the Aluminium-Rich Aluminium-Cobalt-Iron Alloys, With Reference to the Role of Transitional Elements in Alloy Formation. G. V. Raynor and M. B. Waldron. *Proceedings of the Royal Society,* ser. A, v. 194, Sept. 2, 1948, p. 362-374.

Results of study of the above alloys, by micrographic and X-ray methods. It is shown that close analogies exist between the alloys of Al with Fe and Ni, with Fe and Co, and with Co and Ni. 12 ref.

4d-42. Structure of Co_2Al_9. *Nature,* v. 162, Oct. 9, 1948, p. 565-566.

A. M. B. Douglas gives details of lattice parameters as determined from X-ray data by Fourier methods. G. V. Raynor and M. B. Waldron note agreement of these results with the theory that, in Al-rich alloys, transitional metal atoms absorb electrons by filling up their atomic orbitals.

4d-43. Uber eine neuartige Gefugeerscheinung in manganhaltigen Aluminiumlegierungen auf Grund von licht- und elektronenmikroskopischen Untersuchungen. (A New Structure in Low-Manganese Aluminum Alloys Revealed by Light and Electron-Microscopic Examinations.) M. Dudek, H. Mahl, and H. J. Seemann. *Metall,* March 1948, p. 75-80.

The annealed and water-quenched structure of duralumin is not homogeneous, but contains fine Mn containing crystals which are rendered visible only by use of a suitable etchant. The author considers the discovery of this phase to be of great importance to the further development of aluminum alloys.

4d-44. Untersuchungen uber das System Cermischmetall-Wasserstoff. (Research on Cerium-Hydrogen Solid Solutions.) K. Dialer. *Monatshefte fur Chemie,* v. 79, Aug. 1948, p. 296-310.

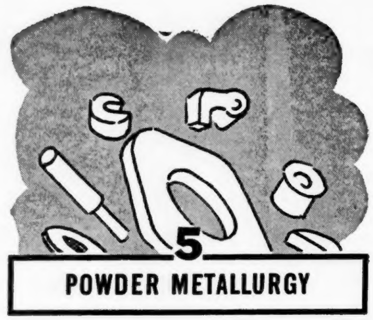
Careful experiments showed that cerium can absorb hydrogen to the point of saturation even at room temperature. Aging phenomena are shown to be confined to the surface of the metal and calculations of equilibria at various temperatures indicate the probability of reaction with hydrogen. 16 ref.

4d-45. L'état "polygonisé" du cristal métallique. (The "Polygonized" Condition of Metallic Crystals.) A. Guinier and P. Lacombe. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 212-214.

Discusses phenomenon, which plays an important part in recrystallization of metals, on the basis of some experimental observations on aluminum and Al-Zn alloys.

For additional annotations indexed in other sections, see:

2b-201-202; 3b-167-185; 3c-102; 3d-60; 9a-92; 27b-46.



5a—General

5a-59. Alloying of Metal Powders by Diffusion. Sidney Weinbaum. *Journal of Applied Physics,* v. 19, Oct. 1948, p. 897-900.

In preparation of alloys by sintering metal powders, the alloy is formed by diffusion of metals into each other. The distribution of metallic powder in space is expressed by means of a triple series; this series is used to obtain the solution of the diffusion equation. The resulting formula gives the concentration of metal as a function of space, time, temperature, and particle size. Sample calculations for a Ni-Cu alloy agree with experimental results.

5a-60. Metal Powders: Production of Ferrous and Non-Ferrous Metal Powders. G. L. Miller. *Canadian Metals & Metallurgical Industries,* v. 11, Oct. 1948, p. 18-22, 44, 46.

Various methods. Production methods and characteristics of the more important types.

5a-61. New Getter Materials for the High-Vacuum Technique. Werner Espe. *Powder Metallurgy Bulletin,* v. 3, Oct. 1948, p. 100-111.

The use of getter materials in high-vacuum technique is based on the ability of certain metals to eliminate free gases by adsorption, absorption, or occlusion. The "coating getters" are usually metal powders applied to electrode surfaces by sintering; "flash getters" are those applied by vacuum deposition. The various new materials in each group.

5a-62. "Cermets". G. A. Bole. *Engineering Experiment Station News* (Ohio State University) v. 20, Oct. 1948, p. 26-27. Reprinted from *O.C.I.A. News Letter,* v. 19, July 30, 1948.

Production, properties, techniques, and processes for ceramic-metal compositions.

5a-63. Preparation des poudres métalliques par électrolyse ignée. (Preparation of Metallic Powders by Fused-Salt Electrolysis.) (Concluded.) M. Andrieux. *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, July-Aug. 1948, p. 77-78.

Electrolytic production from silicides, phosphides, carbides, arsenides, antimonides, and sulphides. The difficulties involved in separation of the products are believed not to be insurmountable, and future prospects appear bright.

5a-64. Powdered-Metal Friction Material. Francis J. Lowey. *Mechanical Engineering,* v. 70, Nov. 1948, p. 869-875.

Production and application to different types of brake bands and similar devices.

5a-65. Trends in Powder Metallurgy. Claus G. Goetzel. *Mining and Metallurgy,* v. 29, Nov. 1948, p. 606-609. Based on Chapter 36 of forthcoming book, "Treatise on Powder Metallurgy", Vol. 2. Interscience Publishers, Inc., New York, 1948-49.

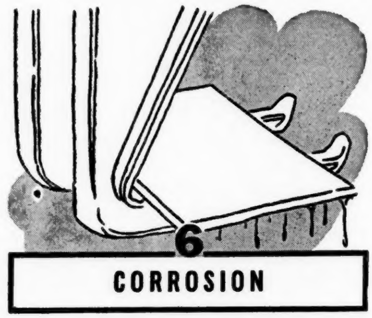
5c—Nonferrous

5c-27. The Sintering of Electrolytic Tantalum Powder. Rupert H. Myers. *Metallurgia,* v. 38, Oct. 1948, p. 307-310.

Effects of temperature and time of heating on some properties of pressed electrolytic tantalum powder. A sintering schedule for electrolytic tantalum powder which has yielded bars suitable for mechanical working.

For additional annotations indexed in other sections, see:

16a-101; 24c-5; 27a-141; 27b-43.



6a—General

6a-124. Cathodic Protection of Buried Metallic Structures Against Corrosion. *American Railway Engineering Association, Bulletin,* v. 50, Sept.-Oct. 1948, p. 147-150.

First of a series of four bulletins prepared by the correlating committee on cathodic protection.

6a-125. The Importance of Controlled Humidity in Long Time Preservation. George C. Wells. *Corrosion and Material Protection,* v. 5, Sept.-Oct. 1948, p. 4-8.

Dehumidification systems used by the Navy in preservation of the "mothball fleet." Illustrations show comparative appearances of metals, fabrics, and other materials, after three years exposure to 30 and 90° humidities. Maintenance of 30° humidity is sufficient to keep most equipment in very good condition.

6a-126. Reactions of Metals and Alloys with Oxygen, Sulphur and Halogens at High Temperatures. Carl Wagner. *Corrosion and Material Protection,* v. 5, Sept.-Oct. 1948, p. 9-12.

Fundamental principles, on the basis of the literature. 43 ref.

6a-127. Industrial Alcohol Versus Construction Materials. *Chemical Engineering,* v. 55, Oct. 1948, p. 235-236, 238, 240, 242, 244, 246, 248, 250, 252.

Part II of a two-part symposium in which a representative group of construction materials are evaluated for services involving industrial alcohol. Includes Stainless Steel, W. G. Renshaw; Aluminum, J. P. Balash and E. D. Verink, Jr.; Lead, Kempton H. Roll; Iron and Steel, A. W. Spitz; Nickel, Nickel Alloys, W. Z. Friend; and Tantalum, Leonard R. Scribner.

6a-128. Transportation and Storage of Strong Nitric Acid. George A. Sands. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1937-1945.

Corrosion tests were made on specimens of stainless steel and alumi-

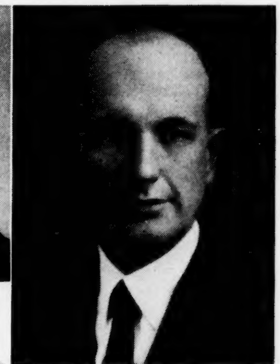
(Turn to page 16)

Appointments to A.S.M. Standing Committees

At the meeting of the Board of Trustees of the American Society for Metals held Oct. 29, new appointments to the various national committees of the Society were announced by President Work and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration of membership.

R. H. Aborn
Publications

J. B. Johnson
Handbook



H. B. Knowlton
Educational

M. J. Stutzman
Constitution

M. Gensamer
Seminar

A. R. Troiano
Advisory Education

New Chairmen of A.S.M. Standing Committees

Advisory Committee on Metallurgical Education

Alexander R. Troiano, University of Notre Dame, Notre Dame, Ind., Chairman '49.
Alfred Bornemann, Stevens Institute of Technology, Hoboken, N. J., '51.
John Chipman, Massachusetts Institute of Technology, Cambridge, Mass., '51.
H. P. Croft, Wheeling Bronze Casting Co., Moundsville, W. Va., '50.
M. A. Grossmann, Carnegie-Illinois Steel Corp., Pittsburgh, '49.
M. A. Hunter, Rensselaer Polytechnic Institute, Troy, N. Y. '50.
R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, '49.
L. M. Pidgeon, University of Toronto, Ont., '49.
John W. W. Sullivan, American Iron and Steel Institute, New York City, '50.
James Gregg, Cornell University, Ithaca, N. Y., '51.

Constitution and By-Laws Committee

Milo Stutzman, Midwest Research Institute, Kansas City, Mo., Chairman '49.
W. J. DeMauriac, Philadelphia Electric Co., Philadelphia, '51.
F. A. Forward, University of British Columbia, Vancouver, B. C., '51.
A. S Jameson, International Harvester Co., Chicago, '50.
William W. Wight, Pratt & Whitney Division, West Hartford, Conn., '50.
Fred J. Robbins, a representative of the Board of Trustees.

Metals Handbook Committee

J. B. Johnson, Wright-Patterson Air Force Base, Dayton, Ohio, Chairman '49.
Taylor Lyman, A. S. M., secretary.
Howard Avery, American Brake Shoe Co., Mahwah, N. J., '49.
R. M. Brick, University of Pennsylvania, Philadelphia, '49.
E. S. Davenport, U. S. Steel Corp., Pittsburgh, '49.
E. O. Dixon, Ladish Drop Forge Co., Cudahy, Wis., '49.
Bruce W. Gonser, Battelle Memorial Institute, Columbus, Ohio, '51.
Max Hansen, Illinois Institute of Technology, Chicago, '51.
R. L. Kenyon, Armco Steel Corp., Middletown, Ohio, '49.
Peter Payson, Crucible Steel Co. of America, Harrison, N. J., '51.
Howard Scott, Westinghouse Electric Corp., East Pittsburgh, Pa., '49.

Publications Committee

R. H. Aborn, U. S. Steel Corp., Kearny, N. J., '49, Chairman.
Ray T. Bayless, A. S. M., secretary.
W. M. Baldwin, Jr., Case Institute of Technology, Cleveland, '51.
Edgar Brooker, United States Spring & Bumper Co., Los Angeles, '51.
C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Alabama, '51.
C. T. Evans, Jr., Elliott Co., Jeannette, Pa., '50.
M. G. Fontana, Ohio State University, Columbus, Ohio, '50.
A. J. Herzig, Climax Molybdenum Co., Detroit, '51.
J. H. Hollomon, General Electric Co., Schenectady, N. Y., '49.
W. E. Mahin, Armour Research Foundation, Chicago, '51.
W. A. Pennington, Carrier Corp., Syracuse, N. Y., '50.
F. N. Rhines, Carnegie Institute of Technology, Pittsburgh, '49.
L. E. Simon, Electro Motive Corp., Chicago, '49.
H. Solakian, John Ek Industries, Inc., Guilford, Conn., '50.
A. R. Troiano, University of Notre Dame, Notre Dame, Ind., '49.
C. A. Zapffe, Baltimore, Md., '50.

Educational Committee

H. B. Knowlton, International Harvester Co., Chicago, Chairman '49.
Ray T. Bayless, A. S. M., secretary.
G. M. Cover, Case Institute of Technology, Cleveland, '49.
H. L. Grange, Darlington, Wis., '50.
N. J. Grant, Massachusetts Institute of Technology, Cambridge, Mass., '51.
J. G. Jackson, Wm. Steel Jackson & Son, Philadelphia, '49.
J. F. Kahles, University of Cincinnati, '50.
Charles L. Lewis, Cook Heat Treating Co., Houston, Texas, '51.

(Turn to page 17)

num used to make drums, and methods of drum fabrication were investigated; tests with sample drums duplicated actual transportation, storage, and weather-exposure conditions. Necessity for proper heat treatment of stainless steel is indicated.

6a-129. Corrosion of Metals in Red Fuming Nitric Acid and in Mixed Acid. Nathan Kaplan and Rodney J. Andrus. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1946-1947.

A number of metals and alloys were tested. Several stainless steels and Duriron exhibited good resistance to corrosion by concentrated HNO_3; Al alloys were more extensively attacked, Haynes-Stellite alloys and chromium were only slightly corroded, and tin, gold, and tantalum exhibited very good resistance, even at elevated temperatures.

6a-130. The Power Plant. Station Design and Material Composition Factors in Boiler Corrosion. R. B. Donworth. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1236-1239.

Previously abstracted from *American Society for Testing Materials, Preprint* no. 106, 1948. See item 6a-59, 1948.

6a-131. Progres dans l'étude de l'oxydation superficielle des métaux et alliages a des températures élevées. (Progress in the Study of Surface Oxidation of Metals and Alloys at Elevated Temperatures). Earl A. Gulbransen. *Revue de Métallurgie,* v. 45, July 1948, p. 181-204.

The rate of formation of oxide was studied by use of the quartz microbalance. Results of electron-diffraction study at elevated temperatures of the structure of oxide films formed on Fe, Co, Ni, Cr, 13% Cr Fe, and 18-8 stainless steel. (To be continued.)

6a-132. Nouvelles applications de la theorie de l'oxydation des metaux possedant deux oxydes. (New Applications of the Theory of Oxidation of Metals Having Two Oxides.) Gabriel Valensi. *Revue de Métallurgie,* v. 45, July 1948, p. 205-210.

Presents further mathematical development of the theory, proposed by the author in 1936 for dry oxidation of metals having two oxides. Experimental confirmation for the case of copper and its two oxides, CuO and Cu_2O. 16 ref.

6a-133. Contribution a l'étude de la mesure et du mécanisme d'action des inhibiteurs de corrosion. (Study of the Measurement of and the Mechanism of the Action of Corrosion Inhibitors.) Léo Cavallaro. *Métaux & Corrosion,* v. 23, July-Aug. 1948, p. 184-190.

A thorough investigation indicates that the limits of indicator efficiency lie within a wide pH interval. The relationship between the crystal structure and inhibiting power of a series of commonly used inhibitors was determined. 57 ref.

6a-134. The Resistance of Alloys to Corrosion During the Processing of Some Foods. J. F. Mason, Jr. *Metallurgia,* v. 38, Oct. 1948, p. 320-327.

Previously abstracted from *Corrosion,* v. 4, July 1948, p. 305-320. See item 6a-70, 1948.

6a-135. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 40, Nov. 1948, p. 87A-88A.

Problems encountered in contact H_2SO_4-plant equipment.

6a-136. A Simple Test Method for Evaluating Corrosion Inhibitors. J. W. Ryznar and J. Greene. *Corrosion,* v. 4, Nov. 1948, p. 505-515.

A solid cylinder of metal is rotated at constant speed for 24 hours in a water containing the inhibitor being evaluated. Visual examination is the main criterion of the results, but supplementary information is obtained by measurement of the potential of the metal with respect to the water and by analysis of the water for iron.

6a-137. Some European Researches on Passivity. U. R. Evans. *Corrosion,* v. 4, Nov. 1948, p. 545-556.

Critically reviews these researches. 57 ref.

6a-138. Corrosion in the Power Industry. Irwin C. Dietze. *Corrosion,* v. 4, Nov. 1948, p. 566, technical section; p. 1, news section.

Use of plastic paint on condenser tubes and other equipment in contact with sea water.

6a-139. The NDHA Corrosion Tester; How it Performs in Use. Leo F. Collins. *Heating Piping & Air Conditioning,* v. 20, Nov. 1948, p. 83-87.

Typical results obtained in connection with various corrosion problems. Influence of accumulated corrosion products; effects of cold working of metals; reproducibility of results; significance of measured values and their correlation with equipment life; appraisal of corrosion inhibitors; atmospheric corrosion in an underground steam system; corrosivity of salt solutions.

6b—Ferrous

6b-124. Use of Wetting Agents in Conjunction with Acid Inhibitors. P. H. Cardwell and L. H. Eilers. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1951-1956.

Use of wetting agents to lower the rates of attack of HCl solutions containing various thiourea and N-ring compounds on steel. The wetting agents do not inhibit corrosion when used alone with HCl. Theory of the phenomenon. 20 ref.

6b-125. Corrosion of Boiler Steels by Inhibited Hydrochloric Acid. P. H. Cardwell and S. J. Martinez. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1956-1964.

Corrodibility of 22 metals used in boiler construction was determined at various temperatures in inhibited HCl solutions. A study was made of the effectiveness of four acid inhibitors and of the method of preparing the test coupons. 20 ref.

6b-126. Prevention of Corrosion in Sour Wells With Organic Inhibitors. William F. Gross and Howard W. Andrews. *Oil and Gas Journal,* v. 47, Oct. 28, 1948, p. 76-79, 113-114.

Results of a carefully controlled 18-mo. field test of four commercial organic corrosion inhibitors in sour, West Texas oil wells.

6b-127. Passivation of Iron by Gaseous Oxygen. (In Russian.) H. A. Shumilova and R. Kh. Burshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 61, July 21, 1948, p. 475-478.

The anodic passivation of iron in a dilute solution previously treated with gaseous oxygen was studied. The influence of temperature on the amount of electricity required to form $Fe(OH)_2$.

6b-128. Corrosion of a Steel Ship in Sea Water. K. N. Barnard. *Canadian Journal of Research,* v. 26, sec. F, Sept. 1948, p. 374-418.

Electrical potentials in the sea close to the hull were studied. The state of the hull was deliberately altered so that the corrosion patterns could be followed under a variety of hull conditions and were supplemented by visual inspections. Some failures of the present anticorrosive technique are indicated and possible remedies suggested.

6b-129. Zur Kenntnis der Korrosionsangriffe durch Vergasertreibstoffe. (Corrosion Caused by Motor Fuels.) P. Schläpfer and A. Bukowiecki. *Schweizer Archiv fur angewandte Wissenschaft und Technik,* v. 14, Sept. 1948, p. 257-274.

The available literature, including the effect of their water content and their physicochemical characteristics. Results of experimental investigation on the basis of which motor fuels are classified into definite groups with respect to their corrosion behavior. Deals only with attack on ferrous metals. 38 ref.

6b-130. The Corrosion of Buried or Submerged Pipes. A. H. Stuart. *Petroleum,* v. 11, Nov. 1948, p. 252-253.

Fundamentals of the problem and results of a series of laboratory experiments made in an attempt to find ways to reduce such corrosion.

6b-131. Corrosion Problems in the Manufacture of Soda Ash by the Ammonia Soda Process. Gustave Heinemann. *Corrosion,* v. 4, Nov. 1948, p. 516-528.

A brief resume of the process, and some of the experiences with corrosion encountered by one producer.

6b-132. Corrosion of Underground Power Cable Sheaths. L. F. Greve. *Corrosion,* v. 4, Nov. 1948, p. 529-540; discussion, p. 541-544.

Several methods employed by a large utility company for mitigating extremely troublesome corrosive conditions caused by local, concentration, and galvanic cells.

6b-133. Pipe Corrosion Mitigation Practices. A. H. Cramer. *World Oil,* v. 128, Nov. 1948, p. 218-220, 222.

Underground pipe protection practices. Followed by Michigan Consolidated Gas Co.

6b-134. Le fer actif dans les solutions alcalines. (Active Iron in Alkaline Solutions.) Gustav Nilsson. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 206-211.

It was found that, under certain conditions, cathodic treatment facilitates rather than prevents corrosion. Activity of iron in alkaline solutions was demonstrated by means of specific organic and inorganic agents. Method of investigation. 19 ref.

6b-135. Corrosion of Iron by Water-in-Oil Emulsion—Part II. Corrosion of Engines by Emulsions. L. C. Verman, M. L. Khanna, S. K. Das Gupta, and K. A. Nair. *Journal of Scientific & Industrial Research,* v. 7B, Sept. 1948, p. 144-148.

Results of accelerated corrosion tests and long-term engine trials show that sodium nitrite is not suitable for use as an additive. Recommends that 0.5% chromium oleate plus 0.5% chromium naphthenate be used as additives to lubricating oils for low-temperature internal-combustion-engine operation, and for pumps and compressors to inhibit corrosion due to emulsified oil. 14 ref.

6b-136. Mechanism of Corrosion of Copper-Containing Steels. (In Russian.) N. D. Tomashov, G. P. Sinel'shchikova, and M. A. Vedeneeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 105-108.

Various theories concerning the corrosion resistance of steels containing 0.2 to 1.0% Cu. It is believed that the increased corrosion resistance of such steels is caused by deposition of finely dispersed copper, which promotes, under certain conditions, anodic passivity of iron. Experimental results seem to confirm this hypothesis. 12 ref.

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COMMITTEES *(Cont.)*

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C. Zener, Institute for the Study of Metals, University of Chicago, '49.

M.I.T. to Build New Lab

A new laboratory building for metal processing studies is among the projects proposed in a $20,000,000 development program announced by Massachusetts Institute of Technology. The proposed laboratory will be a four-story structure containing about 70,000 sq. ft., and will contain facilities for the study of machining, casting, forging, welding and forming.

French Delivers Woodside Lecture

Left to Right at Detroit's "Event of the Year" Are Chapter Chairman Arthur H. Smith, A.S.M. Founder Member William Park Woodside, and Herbert J. French, Who Delivered the Woodside Lecture on Oct. 11

Reported by R. M. McBride
Universal Products Co.

Since the establishment of the William Park Woodside Lecture honoring a venerable founder member and past president of A.S.M., the October meeting each year has become the outstanding event of the year's program for the Detroit Chapter. The series was initiated in 1943, with C. F. Kettering delivering the lecture and accepting an honorary membership in the chapter. The succeeding years brought H. W. McQuaid, W. E. Jominy, A. H. D'Arcambal, and M. A. Grossmann to the rostrum.

The sixth Woodside lecturer was H. J. French, vice-president of the International Nickel Co., Inc., and a past president of A.S.M., who delivered this year's lecture on Oct. 11 entitled "Some Aspects of the Hardenability of Steels".

In introducing the speaker, A. L. Boegehold of General Motors Research Laboratories and another A.S.M. past president pointed out that it was the work of Mr. French on critical cooling rates years ago that furnished one of the bases for the Jominy hardenability test. In view of this earlier work on cooling rates the choice of subject should not be surprising.

With a brief, well-phrased appreciation, the speaker paid tribute to Mr. Woodside, in opening his address. At the conclusion, Chapter Chairman A. H. Smith of Cadillac Motor Co. presented Mr. French with a certificate commemorating the occasion.

The lecture will be distributed in printed form to the Detroit Chapter membership.

Watch for quizz contest in January

Copper Brazing Saves Machining, Time and Materials—Jacobsmeyer

Reported by Alexander Lesnewich
Rensselaer Polytechnic Institute

Great savings in machining, time, and materials are afforded by the proper use of copper brazing in the fabrication of metal products, Lawrence Jacobsmeyer, executive vice-president of Salkover Metal Processing of Illinois, told 75 members of the Eastern New York Chapter A.S.M. on Oct. 12. Mr. Jacobsmeyer's subject was "Copper Hydrogen Brazing".

Brazing is dependent upon the capillary action phenomenon which occurs when the metals to be fastened are placed in intimate contact. Melted in the protection of a controlled atmosphere, the brazing metal will wet the hot base metal and flow into the joint to produce an integral unit by alloying with the parent metal. Mr. Jacobsmeyer said that the brazed unit is 50 to 280% stronger than one fastened with rivets or pins. He likewise emphasized the improved appearance, lightness, and efficiency of the product, as well as its economy of manufacture.

Using numerous slides, the speaker showed how machined forgings and castings have been replaced by brazed stampings. He also showed examples of the methods used for supporting the assemblies while being heated and the continuous, controlled-atmosphere furnaces which are used for heating. Mr. Jacobsmeyer's display of brazed articles was enthusiastically received.

The coffee speaker, Thomas Gallagher, discussed the housing situation in the tri-city area.

6b-137. Intergranular Corrosion of Cast Austenitic Stainless Steels. H. A. Pray. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 387. Translated and condensed from *Revue de Métallurgie*, v. 45, Jan.-Feb. 1948, p. 19-31.

Previously abstracted from original source. See item 6b-103, 1948.

6c—Nonferrous

6c-40. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 40, Oct. 1948, p. 99A-100A.

Corrosion resistance and mechanical and physical properties of titanium and an 89%-Ti, 11%-Cr alloy.

6c-41. An Electron Diffraction Study of Oxide Films Formed on Hastelloy Alloys A, B, C, and D. J. W. Hickman and E. A. Gulbransen. *Journal of Physical & Colloid Chemistry*, v. 52, Oct. 1948, p. 1186-1197.

Results of above study are presented as existence diagrams on a time-temperature scale. Results which should be obtained under identical experimental conditions. 12 ref.

6c-42. Influence of Additions to Lead-Antimony Alloys on the Performance of the Plates of Lead Storage Batteries. II. Investigation of the Kinetics of Corrosion. V. P. Mashovets and A. Z. Lyandres. **III. Overvoltage of Hydrogen on Alloys and Overvoltage of Oxygen on Oxidized Alloys.** V. P. Mashovets and V. N. Fateeva. (In Russian.) *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 21, May 1948, p. 441-455.

In Part II, the characteristics of a series of Pb-Cd alloys containing various small admixtures of Ag, Bi, As, Fe, and Zn, with regard to their corrosion when used as storage-battery plates, were determined. Lead containing no Cd, but 0.33% Ca was also evaluated. The protective effect of Ag, the negative influence of Bi, and the harmful effect of Zn. In Part III, results of overvoltage measurements using specially developed apparatus and a similar series of alloys to that tested in Part II. 11 ref.

6d—Light Metals

6d-39. Stress-Corrosion Tests of High Strength Aluminum Alloys. Hugh Logan and Harold Hessing. *Light Metal Age*, v. 6, Oct. 1948, p. 18, 27.

Previously abstracted from *Journal of Research of the National Bureau of Standards*, v. 41, July 1948, p. 69-85. See item 6d-32, 1948.

6d-40. Sull 'impiego dell 'alluminio nell'industria olearia. (Application of Aluminum in the Food-Oil Industry.) R. Frezzotti. *Alluminio*, v. 17, July-Aug. 1948, p. 342-347.

Two-year immersion in olive oil indicates that welded aluminum (99.0 to 99.5%) containers may be used for storage and transportation of the oil.

6d-41. Testing Stress-Corrosion Resistance of Aluminum Alloys. *Steel*, v. 123, Nov. 8, 1948, p. 121-122.

New test procedures developed and used by the National Bureau of Standards.

6d-42. Intercrystalline Corrosion of Aluminum Alloys. I. Duralumin. (In Russian.) A. I. Golubev. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 22, May 1948, p. 591-601.

With particular emphasis on the corrosion resistance of the intermetallic compound, $CuAl_2$, formed during aging of aluminum. The corrosion resistance of $CuAl_2$ was found to be considerably lower than that of aluminum. Results of the investigation permit a new theoretical approach. 12 ref.

For additional annotations indexed in other sections, see:

3a-124; 3b-175; 3c-102; 19b-148; 27d-18-21.

7 CLEANING and FINISHING

7a—General

7a-216. Finishes for Machine Parts. Joseph Mazia. *Machine Design*, v. 20, Oct. 1948, p. 125-128.

Factors influencing choice of finish.

7a-217. Fabric-Textured Finishes on Metal Goods. Alan Chadwick. *Electroplating and Metal Finishing*, v. 1, Oct. 1948, p. 663-666.

"Flock Spraying" equipment and procedures.

7a-218. Design, Construction and Maintenance of Burning Tool Equipment. A. Rasmussen. *Better Enameling*, v. 19, Oct. 1948, p. 6-7, 35.

Selection of materials, design, construction, and maintenance of tools used in processing of enameled ware. Properties of Ni-Cr alloys.

7a-219. Selection and Application of Wrinkle Finishes. G. A. Conrad. *Industrial Finishing*, v. 24, Oct. 1948, p. 52, 54-56, 60, 62, 64.

7a-220. Finishing Metal Doors. Walter Rudolph. *Industrial Finishing*, v. 24, Oct. 1948, p. 66, 68, 70, 74, 76.

Procedures and equipment.

7a-221. Vapor Degreasing Equipment. George Black and Patricia Lewis. *Organic Finishing*, v. 9, Oct. 1948, p. 9-11, 16.

The various types, their advantages and disadvantages, and applicabilities for specific jobs.

7a-222. Reproducing Wood Grain. Rollin H. Wampler. *Organic Finishing*, v. 9, Oct. 1948, p. 13-16.

How to apply artificial wood-grain decorative finishes to metal, glass, plastic, or wood not having the desired grain.

7a-223. Finishing of Westinghouse Welders. Walter Rudolph. *Organic Finishing*, v. 9, Oct. 1948, p. 22-23.

Methods and equipment.

7a-224. Control of Surface Finish Improves Quality, Cuts Cost. H. R. Clauser. *Materials & Methods*, v. 28, Oct. 1948, p. 74-77.

Significance of roughness, waviness, and lay or scratch pattern and methods for their measurement. How surface-finish control improves quality and cuts costs.

7a-225. Atomizing Alloys. Bill Edwards. *Western Metals*, v. 6, Oct. 1948, p. 34-35.

Metal-spraying process used for applying a variety of nonferrous metals.

7a-226. Descaling Metals; Advantages of the Sodium Hydride Process. N. L. Evans. *Metal Industry*, v. 73, Oct. 8, 1948, p. 287-288.

Process by which it is impossible to overpickle, there being a complete absence of attack on the metal being treated. It is applicable to any metal which is not attacked by molten caustic soda at a temperature not above 370° C.

7a-227. Ceramics for Aircraft Power Plants. John M. Neff. *Iron Age*, v. 162, Oct. 21, 1948, p. 60-63.

In an effort to adapt ordinary ceramic materials to high-temperature applications, investigation is made of a method for producing protective ceramic coatings on metals. The technique embraces such oxide systems as sodium borate, calcium borate, and barium borate with, as a third member, zirconia, titania, alumina, or chromium oxide.

7a-228. Precision Tumbling Processes Improve Finishing Efficiency. C. Heamon Castle. *Steel*, v. 123, Oct. 25, 1948, p. 68-70, 94, 98.

How basic production economies can be effected by good product design combined with mechanical barrel-finishing techniques, using special chips and compounds for grinding, deburring, polishing, and coloring. 20 ref.

7a-229. Ceramic Coated Metals for Aircraft Power Plant Applications. R. A. Jones. *Finish*, v. 5, Nov. 1948, p. 42. A condensation.

Properties and methods.

7a-230. A Survey of Drying Practices in the Porcelain Enamel Industry. George N. Tuttle. *Finish*, v. 5, Nov. 1948, p. 44, 46. A condensation.

7a-231. Das Schliefen und Polieren von sogenannten Weichmetallen. (Grinding and Polishing of So-Called Soft Metals.) Richard Erdmann. *Metalloberflache*, v. 2, March 1948, p. 61-62.

Problems and difficulties, and the use of specific grinding and polishing agents and techniques for best results.

7a-232. Molten Salt Descaling by the Efco-Virgo Process. J. A. Monks and J. McMullen. *Metallurgia*, v. 38, Oct. 1948, p. 311-314.

A descaling process, the main feature of which is chemical and physical modification of the scale by the action of molten salts which are self-regenerative. Originally developed for descaling stainless steels, the process is being increasingly applied to both ferrous and nonferrous alloys, especially where metal wastage in pickling is a serious item.

7a-233. Corrosion Protection Through Emulsions. H. F. Sarx. *Paint and Varnish Production Manager*, v. 28, Nov. 1948, p. 323-324, 326-329. Translated from *Archiv fur Metallkunde*, v. 1, Oct. 1947, p. 455-456.

Nature and production of emulsions and characteristics of water-soluble corrosion preventive emulsions.

7a-234. The Relation of Finishing to Design, Materials and Processing Methods. Edward Engel. *Metal Finishing*, v. 46, Nov. 1948, p. 61-67, 81.

The need for greater coordination of the design, engineering, and production departments with the finishing department. Emphasis is on surface finishing and its relation to the other factors in the production of metal articles. Prices, properties, surface characteristics, for a variety of metals and alloys.

7a-235. Plastic Coatings and Corrosion. C. G. Munger. *Corrosion*, v. 4, Nov. 1948, p. 557-565.

The various types of plastic coatings for metals and the properties required to prevent corrosion under diverse circumstances. Proper

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Tells of Quality Control in Steelmaking

E. M. Schrock (Right) Addressed a Joint Meeting of the Syracuse Chapter A. S. M. and the American Society for Quality Control. J. R. Sadowski (left) is chairman of the Quality Control Group and W. A. Pennington (center) is chairman of the A. S. M.

Reported by Harry A. Johnson
Gear Engineer,
Aircooled Motors, Inc.

A joint meeting with the American Society for Quality Control was held by the Syracuse Chapter A.S.M. on Oct. 3. The speaker was E. M. Schrock, quality control engineer for General Electric Co., and his subject was "Applying Modern Quality Control in a Steel Plant".

Mr. Schrock explained a system that he had installed for Jones & Laughlin whereby information pertaining to the various operations in the process of steelmaking was recorded on punched cards. These could be readily machine sorted, and the information plotted to show variations from a desired mean with respect to any particular feature under investigation.

A wide spread of a few of the plotted points would indicate that some part of the process was out of control. When the cause of such scatter was found and corrected, practically all plotted points would be found to fall within a normal variation which could only be narrowed by some improvement in the normal manufacturing process or procedure.

Mr. Schrock put special emphasis on the necessity for honesty in collecting and recording data. A statement to the effect that "a thing commonly related is probably completely wrong" was illustrated by actual records of an experiment. This proved that changes in tuyere sizes considered absolutely necessary under certain conditions were simply wasted effort.

Data for Ordering Steel Explained To Purchasers

Reported by O. G. Saunders
Metallurgist, Hobart Mfg. Co.

"How to Order Steel" was the subject selected for the Oct. 6th meeting of the Dayton Chapter A.S.M., to which members of the Purchasing Agents' Association were also invited. J. G. Wikoff, manager of order department, Armco Steel Corp., confined his talk to the ordering of sheet steel.

He divided the data for ordering steel into three groups—chemistry, physical data, and miscellaneous covering information for packing, loading, and marking.

Mr. Wikoff remarked that it is often well, particularly in a special-purpose steel, not to tie the supplier to a particular chemical analysis, since it is most desirable to the purchaser that the steel respond satisfactorily to his various fabricating operations. A print of the part should be included with the order so that the supplier can see what is expected of the material.

Physical data should include thickness, given in decimal or weight per square foot; size; method of producing (hot or cold rolled); temper desired; and surface condition. Special operations should be noted, such as stretcher leveling or resquaring.

Obviously, the order should include shipping instructions, and it is often advantageous to have the material packaged and marked in such a way that it can be handled best by the purchaser's particular facilities.

Prior to Mr. Wikoff's talk, the color-sound film, "The Eternal Flame," prepared by Columbia Gas Corp., was shown through the courtesy of the Dayton Power and Light Co. This picture clarified the gas industry's distribution problems.

Sustaining members were guests of the chapter at this meeting, and were presented with A.S.M. certificates by Chairman J. D. Lovely.

Phosphate Coating on Strip From Mill Is Manufacturers' Goal

Reported by Howard J. Wright
Metallurgist
Quality Steels of Canada, Ltd.

The use of phosphate coatings on strip steel as it comes from the mill is the ultimate goal of manufacturers who now coat their own steel products, according to V. M. Darsey, president of the Parker Rust Proof Co., Detroit. Mr. Darsey addressed the Western Ontario Chapter A.S.M. on Oct. 8.

With the aid of slides, Mr. Darsey described the chemical process and reactions involved in the formation of phosphate coatings on metal surfaces to a thickness of 0.0002 to 0.00003 in. The time required to produce such phosphate coatings has been reduced from 2½ hr. to less than 1 min. in the past 20 years, and the cost of application reduced over 75% in spite of present-day increased labor and material costs.

The history of the phosphate coating industry dates from 1907 when articles to be coated were placed in vats containing a dilute solution of phosphoric acid in which iron filings had been dissolved. Many improvements have been made in the original processes, including the use of accelerating agents in the bath and oxidizing agents to prevent the formation of a hydrogen film on the metal surface during treatment. Since 1935 phosphate solutions have been applied to large articles such as automobile bodies, by spraying instead of by immersion.

Phosphate coatings were originally used to resist corrosion, and their corrosion resistance was further enhanced by the use of oil, wax, and other similar finishes applied thereon. The chemical combination of the phosphate coating with metal surfaces produces an ideal condition for painting, and painted surfaces on bonderized metal have greatly improved durability.

In recent years the phosphate treatment known as Parco Lubrizing has been used extensively on bearing surfaces to retard wear. The Parco Lubrite coating absorbs oil readily and insures adequate lubrication of surfaces at the critical break-in period.

Another application of bonderizing involves the treatment of steel to facilitate deep drawing. The bonderite coating thus increases the speed of drawing operations, reduces wear on tools and dies, and produces a smoother surface finish.

The talk was followed by the question and answer period. Past Chapter Chairman Howard J. Wright presented a coffee talk on the history of the American Society for Metals.

formulation for resistance to moisture transmission and the three modes of the latter (direct transmission, osmosis, and electroendosmis). Methods of surface preparation in order of effectiveness, methods of application, and uses.

7a-236. Metal Spraying—A Modern Production Process. A. E. Rylander. *Tool Engineer*, v. 21, Nov. 1948, p. 25-26.

Use for uniform application of metal to both metallic and nonmetallic parts.

7a-237. British Vapour Blast. Frank H. Slade. *Machinery Lloyd* (Overseas Edition), v. 20, Oct. 23, 1948, p. 96-100.

Equipment, method of use, advantages, and applications.

7b—Ferrous

7b-189. Rust Prevention of Equipment in Storage and Use. *Lubrication*, v. 34, Oct. 1948, p. 109-120.

Use of oils, compounds, and greases; procedures for preserving engines, ball and roller bearings, turbines, hydraulic equipment, machine tools, hand tools, spare parts; cleaning; drying; application of rust preventives; packaging; and test methods.

7b-190. Production Painting Setup for Farmall Tractors. R. E. Snyder. *Industrial Finishing*, v. 24, Oct. 1948, p. 42-44, 47-48, 50.

7b-191. Flow Coating Automobile Chassis Frames. Paul A. Peterson. *Industrial Finishing*, v. 24, Oct. 1948, p. 78, 80, 82, 84.

7b-192. Bally Case and Cooler Company. *Better Enameling*, v. 19, Oct. 1948, p. 8-14.

Production of porcelain-enameled commercial refrigerated display cases.

7b-193. A Discussion of the Use of 1300° F. Enamels Applied to Sheet Steel. B. D. Bruce. *Better Enameling*, v. 19, Oct. 1948, p. 16-17, 36.

Advantages and disadvantages over enamels which are fired at higher temperatures.

7b-194. The Production Application of Titanium Enamels. Harold C. Wilson. *Better Enameling*, v. 19, Oct. 1948, p. 18-19, 36.

Recommended procedures.

7b-195. Streamlined Bumper Production. Ezra A. Blount. *Products Finishing*, v. 13, Oct. 1948, p. 20-26, 28, 30, 32, 34.

Polishing, plating, and handling.

7b-196. Barrel Finishing of Metal Products. Part 25. Factors in the Barrel Finishing of Stainless Steels. H. Leroy Beaver. *Products Finishing*, v. 13, Oct. 1948, p. 40, 42, 44, 46, 48, 50, 52.

7b-197. Residual Stresses in Enameled Sheet-Iron Specimens. R. A. Jones and A. I. Andrews. *Journal of the American Ceramic Society*, v. 31, Oct. 1, 1948, p. 274-279.

A method of quantitatively measuring the stresses is explained. It involves measuring with a mechanical strain gage the dimensional changes which occur when an enameled-metal specimen is de-enameled. The theoretical approach to the problem. 11 ref.

7b-198. Roughen Stainless Before Nitriding. S. DeDomenico. *American Machinist*, v. 92, Oct. 21, 1948, p. 96-97.

Ordinary nitriding equipment can be used for martensitic stainless steels, if the surface is roughened by sandblasting, pickling, or bright hardening.

7b-199. Surface Finishing of Stainless Steels. K. M. Huston. *Plating*, v. 35, Nov. 1948, p. 1106-1110, 1142.

Factors involved and recommended methods. Written from the viewpoint of the practical man. Chemical and electrochemical procedures.

7b-200. How to Prevent Defects in Porcelain Enameling Holloware. Part VII. Shorelines, Scratch Blisters, Discoloration of Red Beads. F. A. Petersen. *Ceramic Industry*, v. 51, Nov. 1948. p. 73.

7b-201. Porcelain Enamel Process Defects; Causes and Possible Cures. Part VII. Poor Draining, Burn-off, Sagging. M. E. McHardy. *Ceramic Industry*, v. 51, Nov. 1948, p. 74-75.

7b-202. The Application of Cover Coats Directly on Steel. M. E. McHardy. *Finish*, v. 5, Nov. 1948, p. 39-40. A condensation.

Production methods using titanium steel.

7b-203. The Use of 1300° F. Enamels Applied to Sheet Steel. B. D. Bruce. *Finish*, v. 5, Nov. 1948, p. 42-43.

Previously abstracted from *Better Enameling*, v. 19, Oct. 1948, p. 16-17, 36. See item 7b-193, 1948.

7b-204. The Production Application of Titanium Enamel. Harold C. Wilson. *Finish*, v. 5, Nov. 1948, p. 46, 48. A condensation.

7b-205. Porcelain Enamel for Electrically Operated Products. I. Elias Jones. *Electrical Manufacturing*, v. 42, Nov. 1948, p. 78-81, 172, 174, 176, 178, 180.

Postwar developments in improved base-metal specifications, better enamels, and more efficient methods of application have reduced the cost and increased the field of use for finishing method for electrical appliances. 26 ref.

7b-206. Paint in Civil Engineering. Rolt Hammond. *Paint Manufacture*, v. 18, Oct. 1948, p. 343-346.

Use of paint for prevention of corrosion of outdoor structural steel. Corrosion mechanisms, the effect of welding, and use of metallic coatings.

7b-207. Sheet and Tinplate Manufacture; The Pickling Process. J. H. Mort. *Iron and Steel*, v. 21, Oct. 1948, p. 437-441.

Practical procedures, including details of necessary calculations. (To be concluded.)

7b-208. Finishing Conlon Washers and Ironers. George Conlee. *Industrial Heating*, v. 15, Oct. 1948, p. 1774-1775, 1777-1778, 1780, 1782, 1784-1786, 1847-1848.

Procedures and equipment.

7b-209. High-Temperature Ceramic Coatings for Steel. *Industrial Heating*, v. 15, Oct. 1948, p. 1804, 1806, 1808, 1810, 1812, 1817. Summarized from paper by W. N. Harrison.

Work at the National Bureau of Standards as a result of which a new type of ceramic coating for high-temperature protection of mild steel was developed. The composition of the NBS Type A-19 coating is: 50 parts infusible frit, 25 parts calcined alumina, 10 parts enamelers clay, and other minor ingredients.

7b-210. The Use of Flame Cleaning in Painting Gasholders. *Gas Times*, v. 57, Oct. 8, 1948, p. 31-34.

Experiences in this use of flame cleaning.

7b-211. Oil Composition in Alkaline Cleaning. Samuel Spring and Louise F. Peale. *Industrial and Engineering Chemistry*, v. 40, Nov. 1948, p. 2099-2102.

Free fatty acid was shown to facilitate the removal of oils from pickled steel surfaces. Addition of oil-soluble sodium sulphonate soaps to mineral or lard oil results in improved cleaning, whereas its addition to sulphurized oils usually makes cleaning more difficult.

7b-212. The Successful Application of Titanium Enamels. Harold C. Wilson. *Stove Builder*, v. 13, Nov. 1948, p. 82, 84, 86, 88, 90.

7b-213. Process Sheet for Calorizing Steel. George Black. *American Machinist*, v. 92, Nov. 4, 1948, p. 135.

Calorizing covers a variety of methods for applying and diffusing aluminum to steel (and other metal) surfaces. Recommended procedures.

7b-214. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. Progress Report No. IV. *American Paint Journal*, v. 33, Nov. 6, 1948, p. 8, 10, 26, 28, 30; Nov. 9, 1948, p. 28, 30, 32.

Results of extensive series of tests.

7b-215. Large Steel Products Company Protects Galvanized Steel With Zinc Dust Paint. *Paint Progress*, v. 7, No. 3, [1948], p. 2-3.

As applied to galvanized roofing and siding.

7b-216. Modern Porcelain Enameling. Chapter III. Preparation of Metal. Part I. Alexis J. Hannan and Lee R. Fuller. *Ceramic Industry*, v. 51, Nov. 1948, p. 70-71.

Chemical methods of surface preparation. (To be continued.)

7c—Nonferrous

7c-37. Dry-Tumbled Finishes. *Die Castings*, v. 6, Nov. 1948, p. 47-50, 69-70.

Materials, methods, equipment, and characteristics, especially as applied to die castings. Data presented are based on the "Tumb-L-Matic" process.

7c-38. High-Temperature Attack of Various Compounds on Four Heat Resisting Alloys. D. G. Moore, J. C. Richmond, and W. N. Harrison. *National Advisory Committee for Aeronautics, Technical Note* No. 1731, Oct. 1948, 19 pages.

Certain common ceramic-coating ingredients react with above alloys, thereby limiting their life. 61 compounds, logically useful in such coatings, were tested by placing in contact with Hastelloy B, S-816, S-590, and Haynes Stellite No. 21 and heating in air for 17 hr. at 1500° F. Hastelloy B was much more susceptible to attack than the other alloys. The data indicate that it should be possible to prepare ceramic-coating compositions for high-molybdenum alloys which will prolong their life under conditions which now produce early deterioration.

7c-39. Electron Diffraction Study of Particle Size in Thin Bi Films Deposited by Evaporation In Vacuum. C. T. Keogh and A. H. Weber. *Journal of Applied Physics*, v. 19, Nov. 19, 1948, p. 1077-1082.

Films were studied by the method of microphotometer density-curve analysis to determine changes of the film structure with aging and with increase in thickness of the films. Analysis indicates that the very thin films grow rapidly upon aging into larger crystals. The very thinnest film (about 5 atom layers thick) analyzed exhibited an initial increase in particle size followed by a decrease upon aging. Increase in particle size with increase in thickness.

7c—Light Metals

7d-43. Glycerine in Aluminum Treatments. Milton A. Lesser. *Light Metal Age*, v. 6, Oct. 1948, p. 22, 24-25.

Various commercial and patented methods in which glycerine is used in both chemical and electrolytic finishing processes.

7d-44. Process Sheet For Chrome-Pickle Treatment. George Black.

(Turn to page 22)

Officers and Committeemen, Birmingham Chapter A.S.M.

Officers and Committeemen of the Birmingham Chapter A.S.M., Gathered at the October Meeting, Are (Left to Right): Chairman W. W. Austin, Jr., Warren C. Jeffery, L. C. Stiles, E. A. Brandler, J. A. Bowers, E. C. Wright, Sam F. Carter, R. W. Sandelin, E. M. Whelchel, J. Ernest Hill, Joe P. Flood, G. S. Shoop, H. A. Caldwell, R. B. Oliver and H. A. Lilly. Speaker at the meeting was R. F. Miller, assistant to vice-president, Carnegie-Illinois Steel Corp. Dr. Miller described methods of testing and evaluating metals for high-temperature service. He gave considerable creep and stress-rupture data for various alloy compositions at progressively elevated temperatures. High-temperature service requirements of various parts for jet engines and gas turbines were also included. (Reported by H. A. Lilly, Aluminum Co. of America)

New Techniques for Industrial Plating Meet New Conditions

Reported by W. S. White
Canadian Arsenals Ltd.

"Industrial Electroplating" was the subject for the first meeting of the 1948-49 season of the Montreal Chapter A.S.M. held at the Queen's Hotel on Oct. 4.

A. S. Mitchell, general superintendent of the Union Screen Plate Co. of Canada, Ltd., was guest speaker. In his introduction he explained the difference between decorative and industrial plating—decorative plating being primarily for eye appeal and of somewhat dubious value for corrosion protection, unless the plating is done to exact specification.

Industrial plating is done primarily for resistance to corrosion and resistance to wear. Although a number of metals may be used, chromium and nickel are the most common. Chromium, because of its extreme hardness, low coefficient of friction, and excellent corrosion resisting properties, is the first choice.

Fairly recent improvements in technique have made it possible to deposit chromium on the majority of metals, including aluminum. It is sometimes necessary to build up a base of copper or other metal onto which the chromium is deposited.

An interesting collection of slides showed many applications of industrial plating, covering both new fabrication and the reclamation of worn parts. Of interest were calender, drying and similar types of rolls for the paper, textile and food industries; molds, mixers, platens and hydraulic press rams for the plastic and rubber industries; the reclamation of worn aircraft engine crankshafts, and miscellaneous machined parts for general industrial applications.

The surface of possible applications for industrial plating has barely been scratched, Mr. Mitchell concluded. New techniques are being developed continually to meet new conditions. A job which was impossible a year ago may today be plated with complete satisfaction.

A lively question period ensued during which M. Vogel acted as technical chairman. The procedure of having questions from the floor was tried out for the first time at the Montreal Chapter, and from the response it seemed to meet with great success.

Wide Range of Applications For Magnesium Indicated

Reported by W. E. Burndrett
Pratt & Whitney Division

The subject, "Magnesium Alloys in Industry", was ably discussed at the Texas Chapter meeting held Oct. 5 in Houston. The speaker was Robert E. Bockrath, sales engineer of the Dow Chemical Co.

His talk included a description of present alloys, their composition, properties and fabrication. Design considerations were also included along with the numerous fabricating methods available. The new A.S.T.M. designations were reviewed, including terminology that indicates composition and percentages of alloying constituents.

Current usages of magnesium alloys include aircraft, graphic arts, textile machinery, portable tools and highway transportation applications. Special emphasis was placed on oil field uses, specifically for expendable tools wherein the properties of magnesium provide easy removal by machining or chemical methods. Heavy equipment, such as derricks, substructures and skid bases take advantage of the metal's light weight.

The talk was followed by a sound film on "The Working of Magnesium".

Latin American Markets Hold Promise—Chapman

Reported by R. S. Haverberg
A. C. Spark Plug Division

"Latin America, Our Most Promising Market" was the subject of an informative lecture presented by W. M. Chapman, industry department manager of Westinghouse Electric International Co., before the first meeting of the Saginaw Valley Chapter A.S.M. on Oct. 19.

Central and South American countries are now at the industrial development level at which the United States found itself approximately 75 years ago, Mr. Chapman said. Industrial development is now increasing at a rapid pace, but geographical conditions and the lack of skilled workers and educational facilities are a severe handicap. Hydroelectric plants and electrified railroads under construction will play an important part in industrial development and in raising the standard of living within the next ten years, the speaker predicted.

Past chairmen were also honored at this meeting, as follows: A. G. Spencer (1936-37), R. J. Griffin (1937-38), R. B. Schenck (1938-39), C. M. Campbell (1939-40), A. W. Winston (1940-41), H. A. Austin (1941-42), M. A. Grobe (1942-43), W. F. Marande (1943-44), H. W. Schmidt (1944-45), E. R. Wilson (1945-46), A. H. Karpicke (1946-47), and M. J. Caserio (1947-48).

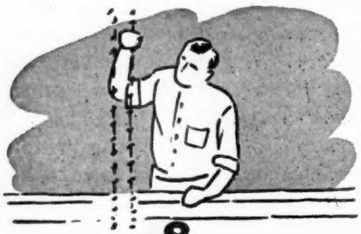
American Machinist, v. 92, Oct. 21, 1948, p. 141.

Treatment applied to magnesium to protect against tarnish and corrosion during handling and storage.

7d-45. Metal Finishing Process Information Sheets. I and II. George Black. *Product Engineering,* v. 19, Nov. 1948, p. 157, 159.

The following treatments for aluminum; chromic acid anodizing process, alodizing, alumilite process, bonderite 170, Alrok, Alumox, Alumatreet, and Alzak.

For additional annotations indexed in other sections, see: 16a-107; 16b-96; 20b-91.



8

ELECTRODEPOSITION and ELECTROFINISHING

8-232. Electroplating on Aluminum Extends Use of This Material. Harold A. Knight. *Materials & Methods,* v. 28, Oct. 1948, p. 84-88.

Advantages and applications. Special reasons for Al plating; the corrosion factor, and highlights of the process.

8-233. Practical Points on Chromium Plating. Robert L. Buckley. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 626-628.

Every effort has been made to keep the terms and explanations on a purely practical basis. American practice is dealt with.

8-234. Control of Electroplating Solutions by Analysis and Observation. IV. Chemical Control of Acid Copper Plating Solutions. K. E. Langford. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 646-649.

Written for the plater with only a little chemical knowledge.

8-235 Microchemical Methods of Control of Plating Baths. F. G. Gerke, Z. I. Dreval, and V. P. Zvereva. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 667-668, 674. Translated from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 12, 1946, p. 908-914.

Analytical methods for copper baths and for chromium-plating baths.

8-236. Electroplating Hazards and Nuisances. R. W. Oyler. *Plating,* v. 35, Nov. 1948, p. 1111-1114.

Gross-contact injuries; poisoning; injuries to the nose, throat, and lungs in particular and to all body surfaces in general, caused by air-dispersed materials; harmless but unpleasant odors; and stream pollution and similar problems.

8-237. Effect of Impurities and Purification of Electroplating Solutions; Some Effects of Copper in Nickel Plating Solutions on the Salt Spray Resistance of Nickel and Nickel-Chromium Deposits on Steel. D. T. Ewing, Robert Rominski, and William King. *Plating,* v. 35, Nov. 1948, p. 1122-1123.

Copper was found to reduce salt-spray resistance. Work was a part of A.E.S. Research Project No. 5.

8-238. Die Harte von Hartchromschichten und die Stromausbeute in Abhangigkeit von den Abscheidungsbedingungen. (Effect of Deposition Conditions on the Hardness of Hard-Chromium Layers and on the Current Consumption.) Walter Eilender, Heinrich Arend, and Eugen Schmidtmann. *Metalloberflache,* v. 2, March 1948, p. 49-52.

Shows that every current density has an optimum bath temperature at which optimum hardness is obtained. Maximum hardness is inversely proportional to current density up to about 100 amp. per sq. dm. and it decreases as the bath temperature rises or falls above or below an optimum point. In H_2SO_4 baths, the luster of the plating is directly related to its hardness.

8-239. Die Tiefenstreuung in den galvanischen Badern. (Depth Variations in Galvanic Baths.) Johannes Fischer. *Metalloberflache,* v. 2, March 1948, p. 53-60.

Unequal distribution of electric current in electroplating baths, resulting in uneven deposition of metal. Methods proposed to correct this difficulty are critically evaluated; and a nickel bath is used as an example to explain Mantzell's and Haring's results. 20 ref.

8-240. Semi-Automatic Plating; Design and Construction of Equipment. A. F. Brockington. *Metal Industry* (London), v. 73, Oct. 22, 1948, p. 326-328.

Recommended when articles are subject to frequent changes in design, or the metal is not of uniform quality.

8-241. Plating in the Recording Industry. Marvin Rubinstein. *Metal Finishing,* v. 46, Nov. 1948, p. 52-60.

Phonograph records are pressed from thermoplastic materials using metal molds known as "stampers". First step is metallizing the lacquer disk, followed by successive nickel plating, copper flashing, and electroforming the master, which is a negative replica of the lacquer disk. After several finishing operations, a "mother" or positive replica, is electroformed on the master, removed, finished, and plated to form the stamper.

8-242. Heavy Nickel Deposition as a Manufacturing Operation. S. Wernick and F. Willetts. *Metal Finishing,* v. 46, Nov. 1948, p. 76-81.

Process developed to produce "heavy" nickel coating on a cast-iron base, free from nodules and possessing physical characteristics enabling the deposit to be readily and economically ground to size.

8-243. Thickness Testing of Electroplated Coatings. *Metal Finishing,* v. 46, Nov. 1948, p. 87.

Principles, advantages, disadvantages, and remarks concerning the microscopic, the Mesle's chord, the magnetic, the chemical, and the electrochemical methods.

8-244. Electroplating Methods Used in One of the World's Largest Installations. *Machinery,* v. 55, Nov. 1948, p. 208-212.

Methods and equipment of Pontiac Motor Div.

8-245. Electropolishing Stainless Steels. Arthur P. Schulze. *Steel,* v. 123, Nov. 15, 1948, p. 109, 112, 114, 145-146, 148.

Principles, procedures, equipment, and applications. Practical value as a production tool is being demonstrated on more than 65 different types of products, parts, and assemblies. The method is designed to supplement, rather than to replace, mechanical polishing procedures.

8-246. Sur l'existence de microfissures dans les dépots de chrome électrolytique; Leur influence sur la limite de fatigue des pièces d'acier. (Existence of Microfissures in Deposits of Electrolytic Chromium; Their Influence on the Fatigue Strength of Steel Parts.) P. Bastien and A. Popoff. *Métaux & Corrosion,* v. 23, Sept. 1948, p. 191-198.

Presence of a fan-shaped acicular structure in electrodeposited chromium. This apparent structure is said actually to represent a series of small fissures. It seems that such fissures have a very unfavorable influence on the fatigue-bending strength of chromium-plated alloy steel containing 13% Cr. Causes of this phenomenon. 27 ref.

8-247. Orientierte Abscheidung von Oxyd bei der anodischen Oxydation. (The Structure of Oxide Films Formed by Anodic Oxidation). K. Huber and B. Bieri. *Helvetica Physica Acta,* v. 21, Sept. 30, 1948, p. 375-378.

The results of X-ray and electron microscopic study of oxide films on zinc.

8-248. Recovery of Defective Steel Parts by Electro-Deposition. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 398. Translated and condensed from *Machines et Métaux,* v. 32, May 1948, p. 161-162.

How steel parts which have been scrapped because of faulty machining can be salvaged by building up with electrolytic deposits of chromium or nickel.

8-249. The Metallography of Electrodeposited Surfaces. The Influence of Substrate Surfaces on Electrodeposition I. The Nature of a Metal Surface. A. T. Steer. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 629-635.

The influence of the condition of a metal surface on the electro-deposit subsequently applied. This article is an introduction to the topic. (To be continued.)

8-250. Outplating at the Verichrome Plating Co., Walsall, England. (Continued.) *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 638-645.

This installment deals with anodizing, dyeing, bright nickel plating, barrel chromium plating, the current supply, and the bronzing department. (To be concluded.)

8-251. A Study of Chemically Deposited Silver Mirrors. Raymond Morgan and Ralph D. Myers. *Journal of the Franklin Institute,* v. 246, Nov. 1948, p. 363-376.

The nature of mirrors produced by various methods was studied in order to gain information, particularly on: structure of the silver coatings; the effect of impurities; and associated chemical compounds in cases of spoilage. X-ray and electron diffraction were extensively used in the study.

8-252. The Measurement of Permeability Characteristics of Anodic Films on Aluminum. Robert L. Burwell, Jr., and Thomas P. May. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 195-213.

Various techniques for quantitative study of the permeability of anodic aluminum oxide by measurement of rates of diffusion of salts through the film, and conductance of the film using salt solutions as electrodes. These techniques were applied to anodic films prepared by complete anodization of aluminum foil and to films separated from anodized aluminum by action of solutions of mercuric chloride. Variations of permeability accompanying changes in different factors. 22 ref.

8-253. Electrodeposition of Cobalt-Tungsten Alloys From a Citrate Bath. Walter E. Clark and M. L. Holt. *Jour-*

(Turn to page 24)

Isocolloidal Theory Gives New Concept Of the Solid State

Reported by W. F. Murphy
Metallurgist, Crucible Steel Co. of America

An isocolloidal theory for the solid state, particularly as applied to metals, was proposed by Carl A. Zapffe, metallurgical consultant in Baltimore, at the October meeting of the Pittsburgh Chapter A.S.M.

According to Dr. Zapffe, the metallic solid state consists of an "aggregate of aggregates", the fundamental particle being an aggregate of atoms of colloidal dimensions developing within its own liquid phase—hence the term "isocolloid". The theory, he stated, can be condensed from its broader aspects into seven principal points:

1. That a condition of aggregation of atoms initiates in the liquid state at some stage previous to solidification, this condition being tentatively referred to as *isocolloidal.*
2. That the physical shape and other characteristics of these particles are a function of such factors as crystallographic system, size of particle, surface tension, composition, and temperature.
3. That solidification has the nature of *gelation,* or agglomeration, of these isocolloidal units.
4. That their approximate matching of orientations upon solidification provides the gross structure known as the lineage, or grain, or crystal.
5. That their *mismatching provides the imperfection structure of the crystal,* which has been so widely discussed, and so pointedly observed in fractographs.
6. That this imperfection structure is therefore an intrinsic and as yet unavoidable feature of all "real" crystals, and that it has a pattern of colloidal dimensions and involves laticular hiatuses considerably exceeding the magnitude of one atom.
7. That all subsequent chemical, physical, and mechanical operations performed on or by the solid are predicated upon and involve these inter-colloidal discontinuities.

In support of this theory, Dr. Zapffe discussed the known great divergence between theoretical strengths of metals and their actual strengths; he pointed out that this difference is of the same degree as that between the powerful valence forces operating between atoms and the much weaker nonvalence cohesive, or van der Waal's forces which would operate between such blocks of atoms as postulated. He then proceeded to demonstrate the isocolloidal concept with experimental evidence collected during ten years' work on the nature of hydrogen in iron and steel and on the structures obtained by fractography—particularly a study of twinning, deformation lines, cleavage and Neumann bands.

At the conclusion of his talk Dr. Zapffe showed how his theory explains the brittleness of steels in which hydrogen is dissolved; this embrittlement is due to tri-axial stresses from gas compressed within the imperfections. Precipitation hardening with increased tensile strength and lower ductility was explained on the basis of the precipitating phase utilizing the imperfections as nuclei and thereby welding the blocks together to increase cohesion (witnessed as an increased tensile strength), and keying the blocks to reduce their sliding on one another (reducing ductility much in the manner originally postulated by Jeffries and Archer). The effect of small amounts of impurities was explained on this same basis, a very small proportion exerting a great effect when precipitating within the disjunctions between the imperfectly matched isocolloidal particles.

Dr. Zapffe was bombarded with questions at the conclusion of his talk, most of them pertaining to other metal phenomena which might be explained on the basis of the isocolloidal theory.

Detroit Has New Secretary

Howard L. Grange, secretary-treasurer of the Detroit Chapter A.S.M., has resigned this post because of a change of location. Mr. Grange, formerly of General Motors Research Laboratories, is going into the lumber business in Darlington, Wis.

The office of secretary-treasurer will be filled by R. C. McCleary of Chrysler Corp., at present vice-chairman of the chapter. A new vice-chairman will be elected by the Executive Committee of the chapter.

Expects More Small Steel Plants

Harry W. McQuaid (Second From Left), Leading Consultant to Steel Plants, Addressed the Baltimore Chapter on Oct. 18. Others in the photograph are (left to right) Donald W. Kalkman, secretary-treasurer; Mr. McQuaid; Thomas L. Moore, chairman; and C. Thompson Stott, vice chairman

Reported by Howes Bodfish
Aluminum Co. of America

Abandonment of the basing point system will probably result in the establishment of small semi-integrated steel plants in selected localities within the visible future, Harry W. McQuaid, leading consultant to steel plants, told the Baltimore Chapter A.S.M. at a meeting at the Engineers Club on Oct. 18.

Mr. McQuaid pointed out that existing freight rates, coupled with high material and labor costs, encourage migration of large users of steel to the vicinity of low-cost plants. At the same time, he stated, small plants using modern electric furnaces pouring billet-type ingots, integrated with continuous processing equipment, can make specialized products in areas beyond the reach of the largest centers. Michigan and Minneapolis were cited as examples.

Competition will be tough some day between areas, between large producers and between large and small producers. Careful long-range planning and use of intelligent research are indicated.

It was stressed that the competent metallurgist must consider manufacturing costs—particularly machining costs—and prices of alloy metals for correct selection. Intended use, the design and the function of the part to be made must always be considered.

In short, a good metallurgist must make recommendations as though he were a principal stockholder as well as an honest employee.

Thomas L. Moore, chairman, handled the meeting and C. T. Stott introduced the speaker. M. Wilson McFarlin, Special Agent, discussed "The Inner Workings of the F.B.I." during a coffee talk.

Watch for Quizz Contest in January

nal of the Electrochemical Society, v. 94, Nov. 1948, p. 244-252.

An aqueous bath suitable for the electrodeposition of Co-W alloys, containing approximately 50% W. The bath contains cobalt sulphate, sodium tungstate, and citric acid in the approximate mole ratio 1:1:1.5. Bright cathode deposits are obtained over a wide range of current densities. Anodes of Co or of W or both, or of some inert material, may be used.

8-254. Codeposition of Tungsten and Iron From an Aqueous Ammoniacal Citrate Bath. M. H. Lietzke and M. L. Holt. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 252-261.

New aqueous plating bath. Experiments on three baths having different concentrations of sodium tungstate. The bath proposed is also suitable for the electrodeposition of Ni-W and Co-W alloys.

8-255. The Effect of Pressure on Current Efficiency of Copper Electrodeposition From Cyanide Solutions. Roy E. Webb and Henry B. Linford. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 261-270.

The efficiency is improved by decreasing the total pressure on the bath. A simple mathematical relationship relating deposition efficiency to pressure and current density. Possible applications.

8-256. The Electrodeposition of Lead from Lead p-Toluene Sulfonate Solutions. Frank C. Mathers and John C. Griess, Jr. *Journal of the Electrochemical Society,* v. 94, Nov. 1948, p. 46N-50N.

A method for preparation of p-toluene sulphonic acid. Effects of a number of addition agents on cathode deposits of lead from solutions. Smooth solid deposits were obtained by the use of aloes residue combined with glue. Aloin, thymol, 4-hydroxy-1, 3-dimethylbenzene, and eugenol were less effective. Throwing power was found to be about half that of the fluosilicate bath. Conductivity of the bath containing 20% free acid was equal to that of the fluosilicate bath containing 7% free acid.

8-257. Platings for Machine Parts: Their Selection and Application for Decorative and Functional Purposes. C. L. Faust and Wm. H. Safranek. *Machine Design,* v. 20, Nov. 1948, p. 145-148.

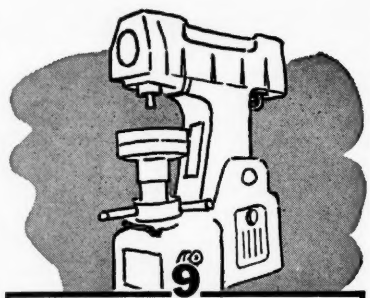
Discussion of the properties and applicabilities of the various types.

8-258. Electroformed Parts May Be Your Answer. *American Machinist,* v. 92, Nov. 18, 1948, p. 107-111.

The electro-forming process and some of its applications.

For additional annotations indexed in other sections, see:

9a-90; 10a-105; 18d-14; 27a-139-145.



PHYSICAL and MECHANICAL TESTING

9a—General

9a-90. Hardness Testing of Electrodeposits. II. Laboratory & Commercial Instruments. C. W. Smith. *Electroplating and Metal Finishing,* v. 1, Oct. 1948, p. 653-661.

Instruments for microhardness testing and methods of use.

9a-91. Obtaining Fatigue-Test Data. J. A. Sauer and P. K. Roos. *Machine Design,* v. 20, Oct 1948, p. 115-117, 158, 160, 162.

Methods of use of the Sonntag fatigue-testing machine, the development and construction of which were described by B. J. Lazan in an article in the May 1947 issue. The machine is primarily suited for superposition of static loads so that mean stresses other than zero can be studied.

9a-92. The Use of Flat-Ended Projectiles for Determining Dynamic Yield Stress. I. Theoretical Considerations. Geoffrey Taylor. **II. Tests on Various Metallic Materials.** A. C. Whiffin. **III. Changes in Microstructure Caused by Deformation Under Impact at High-Striking Velocities.** W. E. Carrington and Marie L. V. Gayler. *Proceedings of the Royal Society,* ser. A., v. 194, Sept. 2, 1948, p. 289-331.

In Part II, the experimental technique devised to apply the method studied theoretically in Part I is described. Results of application to various steels, duralumin, copper, lead, iron, and silver. In Part III, the mechanism of the deformation was studied by examination of microstructures. The amounts of residual strain in mild steel and duralumin were determined by observing microstructural changes on annealing. Hardness surveys were also made.

9a-93. Notch Impact Sensitivity. (In Russian.) N. N. Davidenkov and S. E. Belyaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 963-968.

Proposes a new quantitative formula for "notch effect". According to this formula, yield point of the notched specimen minus yield point of a simple test specimen is divided by the latter value to give a coefficient which may be either positive or negative. The value of such a coefficient is indicated by the experimental results.

9a-94. Influence of Offset During Investigation of Torsion. (In Russian.) I. M. Roitman and Ya. B. Fridman. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 969-972.

Indicates, on the basis of experimental investigation, that offset of specimens up to 4° does not show marked effect on the results of normal torsion tests on most of the materials which are fractured by shearing action.

9a-95. Method of Determination of Microhardness During Investigation of Thin Metallic Surface Layers. (In Russian.) B. I. Kostetskii and P. K. Topekha. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 972-977.

Techniques and apparatus for microhardness testing of metallic surface layers deposited by plating, dipping, or otherwise. Typical results, showing impressions made by the pyramid indenter.

9a-96. Apparatus for Determining the Hardness of Gears. (In Russian.) T. A. Vvedenskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 1016.

Apparatus is described and diagrammed. Calculations show method of interpretation of results.

9a-97. 5,000,000-Lb. Testing Machine. *Mechanical Engineering,* v. 70, Nov. 1948, p. 900-902.

Machine in the aeronautical Structures Laboratory, U. S. Naval Experimental Station, Philadelphia. Arrangements for use by industry are planned.

9a-98. Creep Measurement With Wire Gauges. *Electrical Engineering,* v. 67, Nov. 1948, p. 1049.

Use of SR-4 bonded resistance-wire strain gages instead of the conventional extensometer as reported by the Canadian Bureau of Mines. This method is said to be simple, accurate, and sensitive, and avoids the problem of attaching cumbersome and inconvenient mechanical devices to test specimens.

9a-99. Navy Using Largest Test Machine. *Aviation Week,* v. 49, Nov. 8, 1948, p. 33.

New 2500-ton-capacity Baldwin unit at Philadelphia Navy Yard which is available to manufacturers for tests of aircraft, automotive, ship, and gun assemblies.

9a-100. Micro- and Macro-Deformations of Metals and Alloys Under Longitudinal Impact Loads. Part II. Georges Welter. *Metallurgia,* v. 38, Oct. 1948, p. 328-330.

A second testing method and apparatus. The difference between the first and the second series of tests was that, although a pendulum-type loading system was retained, the specimen did not move with the hammer, but was rigidly fixed in the base of the machine. However, results were unsatisfactory, hence use of pendulum-impact devices was abandoned. (To be continued.)

9b—Ferrous

9b-55. Torsion or Flexion? An Examination of Test. *Wire Industry,* v. 15, Oct. 1948, p. 668.

Pros and cons of the two test methods, as applied to wire rope.

9b-56. Determination of Young's Modulus and the Shear Modulus of Certain Steels at 20 to 600° C. by an Electronic Technique. (In Russian.) M. M. Pisarevskii. *Kotloturbostroenie* (Boiler and Turbine Manufacture), May-June 1948, p. 24-26.

A new method using a sound generator and an audio-frequency amplifier. Dependences of Young's modulus of shear, and Poisson's coefficient for a series of steels used in boiler manufacture.

9b-57. Impact Strength of Steel Under Compressive Stress. (In Russian.) D. M. Zagorodskikh. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 1010-1012.

A specially developed test apparatus is used. Data derived.

(Turn to page 26)

Comstock Speaks on Powder Metallurgy

Reported by J. G. Cutton
Metallurgist, Carnegie-Illinois Steel Corp.

The contributions of powder metallurgy during the war ranged through such various products as tungsten carbide cutting tools and dies, bearing alloys, electrical contact alloys, and armor-piercing projectiles, according to Gregory Comstock, director of the new powder metallurgy laboratory at Stevens Institute of Technology. Professor Comstock traced the development of powder metallurgy from the earliest work with tungsten filaments to present-day uses, in an address before the Mahoning Valley Chapter on Oct. 12.

Great effort is being made to improve and develop alloy parts by powder metallurgy which will stand up under the intense heat developed in jet engines, high speed turbines and guided missiles, Professor Comstock continued.

Alloys which cannot be made in the usual way by melting and casting are made by powder methods. Nickel and silver do not mix when liquid, but can be made into usable alloys by powder metallurgy. Electrical contacts made from these alloys have wide application. Welding machine electrodes were unsatisfactory when made of pure copper because of serious pitting. Finally a tungsten-copper powder mixed in definite proportions solved this problem.

In summing up his points, Professor Comstock made two general statements: (*a*) Metals which are not readily alloyed by casting can be made by powder methods, and (*b*) metals which are not forgeable in cast condition lend themselves to powder metallurgy methods.

Chapter Chairman and Speaker at Mahoning Valley Chapter's October Meeting Are (Left) James E. Phillips of Cold Metal Products Co. and (Right) Prof. Gregory Comstock

Named Western Sales Agent

E. R. Griner of Kansas City, Mo., has been appointed western sales agent for the Electric Furnace Co. of Salem, Ohio. Mr. Griner, who until recently had been furnace engineer for the Wright Aeronautical Corp., was formerly an erection and service engineer with Electric Furnace.

Horger Speaks on Design

Reported by E. W. Husemann
Metallurgist, Copperweld Steel Co.

Warren Chapter opened its current season with a talk in layman's language on Oct. 14. O. J. Horger, chief engineer of the railway division, Timken Roller Bearing Co., spoke on "What Every Metallurgist Should Know About Design".

Interpretation of strength of structural members from the standpoint of service and design, and the influence of applied and residual stresses on design and service life were shown by slides and by a chalk talk. Improvement of fatigue strength by design and surface treatment was also indicated.

12-Cylinder Vocabulary Of Physicist Earns Respect of Coloradoans

Reported by F. R. Anderson
Chief Metallurgist, Gardner-Denver Co.

At the Rocky Mountain Chapter's meeting on Oct. 15 in Denver, Jack T. Wilson, physicist for the Allis-Chalmers Mfg. Co., accomplished the unlikely feat of keeping a good attendance of Colorado metallurgists entertained and interested in a discussion devoted primarily to the principles of atomic physics, and to the purest of physical research.

Introducing his subject, "The Structure of Metals", with brief, well-integrated summaries of such fundamental but formidable principles as the theory of nuclear and atomic structures, isotopes, and artificial radioactivity, Dr. Wilson gave most of his attention to discussions of the generation and properties of ordinary and high-energy X-rays, the theory of crystal analysis by X-ray diffraction and radiographic methods in research and in industry.

Particularly impressive were his data and photographs illustrating the remarkable sensitivity and penetrating power of the 20-million volt betatron. Among incidental sidelights entertainingly treated were: transmutation of silver dollars into slot-machine slugs; Einstein's work on relativity; occupational diseases among tap-dancers; and a speculative but plausible and well-documented correlation among incidence of active silicosis, piezoelectric effects in finely divided crystals, and solar radiation in the longer wave-lengths.

Dr. Wilson's audience left with respect (if not affection) for the 12-cylinder vocabulary of physics, and with a new appreciation of the contributions of the physicist, his tools, and his techniques, to fundamental knowledge in the field of metallurgy.

Rockford Members Inspect Operations at Two Plants

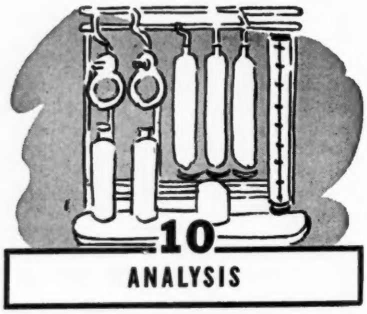
A Large Group of Members of Rockford Chapter A. S. M. Participated in the Annual Plant Visitation on Oct. 20. Two companies were inspected. Columbia Tool Steel Co., Chicago Heights, Ill. was visited in the morning, and after lunch the group toured Bliss & Laughlin's cold finishing operations at Harvey, Ill. The day's events were pleasantly concluded with a dinner. (Reported by H. E. Habecker)

9d—Light Metals

9d-9. Creep Test Machine for Light Alloys. (In Russian.) K. I. Portnoi and A. V. Rudnev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 985-990.

For long and short-time creep tests at temperatures from 350 to 400° C. This machine is characterized by its simplicity, compactness, and ease of production in industrial shops. Details of construction and examples of tests performed, with corresponding diagrams.

For additional annotations indexed in other sections, see: 6d-39.



10a—General

10a-89. Bibliography of Publications Dealing with the Polarographic Method in 1947. (In English.) J. Heyrovsky and O. H. Muller. *Collection of Czechoslovak Chemical Communications,* v. 13, July-Sept. 1948, p. 481-491.

Presents 185 references, including 17 from earlier years, omitted inadvertently from previous bibliographies by the authors.

10a-90. Basic Aspects of X-Ray Absorption in Quantitative Diffraction Analysis of Powder Mixtures. Leroy Alexander and Harold P. Klug. *Analytical Chemistry,* v. 20, Oct. 1948, p. 886-889.

Pertinent mathematical relationships are developed which relate the diffracted intensity to the absorptive properties of the sample. 12 ref.

10a-91. Polarography; Some Factors Affecting Drop Time. F. L. English. *Analytical Chemistry,* v. 20, Oct. 1948, p. 889-891.

The influence of capillary vibration, applied voltage, magnitude of current flowing through the cell, capillary active agents, purity of mercury (including certain amalgams), and stray currents in the constant-temperature bath. 11 ref.

10a-92. Polarographic Determination of Iron. Louis Meites. *Analytical Chemistry,* v. 20, Oct. 1948, p. 895-897.

Iron can be determined polarographically by measuring the height of the anodic wave of ferrous iron in a slightly acidic oxalate supporting electrolyte. Two methods for preparation of the solution. With small percentages of iron, the method is capable of much greater accuracy than volumetric or gravimetric procedures. 24 ref.

10a-93. Photometric Determination of Arsenic in Copper and Copper-Base Alloys. O. P. Case. *Analytical Chemistry,* v. 20, Oct. 1948, p. 902-904.

Method is applicable to the determination of arsenic in arsenical brass, arsenical copper, fire-refined copper, lead and tin-base bearing metals, and openhearth iron. It is somewhat more rapid than conventional distillation-volumetric procedures, and it allows the use of smaller samples and gives a better recovery of arsenic. 13 ref.

10a-94. Determination of Iron and Manganese. *Chemical Age,* v. 59, Oct. 2, 1948, p. 459.

Recent findings of Russian chemists.

10a-95. A Rapid Method of Spectrographic Analysis. H. R. Clayton. *Journal of the Society of Chemical Industry,* v. 67, July 1948, p. 270-273.

Process developed to enable spectrographic analysis to be carried out in approximately 10 min. Speed has been attained chiefly through attention to methods of processing the photographic plates, which are developed and fixed in ultra-rapid reagents, washed for a minimum time and dried in an oven designed for the purpose. Application of the method has been to metals only.

10a-96. Gravimetric Determination of Thallium with Tetraphenylarsonium Chloride. Wm. T. Smith, Jr. *Analytical Chemistry,* v. 20, Oct. 1948, p. 937-938.

10a-97. Progress Standards—Basic Indicators of Work of Laboratories (Analytical). (In Russian.) A. M. Dymov, M. V. Babaev, P. I. Shportenko, P. N. Tereshchenko, E. I. Grenberg, P. Ya. Yakovlev, T. I. Veitablit, N. E. Klaz, N. V. Tananaev, K. A. Nabatova, D. V. Bashkirov, K. I. Nikolskaya, and E. Ya. Shmulevich. *Zavodskaya Laboratoriya* (Factory Labortory), v. 14, Aug. 1948, p. 897-918.

A series of articles indicating the times allotted for different analyses in Russian analytical laboratories. Gravimetric, volumetric, colorimetric, spectrometric, and polarographic determinations as applied to different metals, alloys, and ores. Much of the information is shown in tables.

10a-98. Improved Apparatus for the Extraction of Iron by Ether. (In Russian.) A. M. Daemov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 995-997.

The apparatus is applicable to determination of iron in alloys; method of use.

10a-99. Colorimetric Determination of Manganese Compounds Present in the Air. (In Russian.) D. N. Finkelshtein and A. I. Kruzhevnikova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 998-1000.

A new method for analysis of the fumes given off during smelting of manganese steels and alloys in electric furnaces.

10a-100. Colorimetric Determination of Aluminum and Titanium in High Temperature Alloys. Louis Silverman. *Chemist Analyst,* v. 37, Sept. 1948, p. 62-64.

Details of procedure.

10a-101. Application of Triethanolamine to the Spectrophotometric Determination of Copper in Ores. J. P. Mehlig and Dorothy Durst. *Chemist Analyst,* v. 37, Sept. 1948, p. 52-55.

Method which depends upon formation of a complex copper compound with triethanolamine and measuring the transmittancy at 650 mu of the resulting color system. Results agree closely with those obtained by the iodide method.

10a-102. A Direct Reading Analytical Spectroscope. Frederick K. Vreeland. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 600-611.

A system of spectroscopic analysis is described which eliminates measurement of wave lengths and reference to tables by direct comparison of the spectrum of the sample with master spectra of the several elements.

10a-103. Notes on the reliability of the X-Ray Diffraction Spectrometer for Quantitative Mineral Analysis. Howard F. Carl. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 645-648.

Discusses criticism of recent paper by the author.

10a-104. X-Ray Fluorescence Analysis. J. L. Abbott. *Iron Age,* v. 162, Oct. 28, 1948, p. 58-62; Nov. 4, 1948, p. 121-124.

Nondestructive method for analysis of metallic and nonmetallic substances which can be applied to finished products as well as to raw materials. Principles and a description of methods, particularly for metals. Concluding article describes various specific applications and includes X-ray fluorescence-spectra patterns for 16-25-6 alloy and for tungsten.

10a-105. Analytical Methods in Plating Baths. J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 46, Nov. 1948, p. 68-75.

Specific analytical methods for acids, ammonia, cadmium, carbonate, chloride, chromium, copper, cyanide, gelatine gold, indium, iron, lead, nickel, resorcinol, Rochelle salt, silver, sodium acetate, sodium hydroxide, sodium thiocyanate, sulphate, tin, and zinc.

10b—Ferrous

10b-71. Spectroscope Used to Identify Stainless Steel Grades. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 71.

New practice at Wood works of Carnegie-Illinois Steel Corp.

10b-72. Polarographic Determination of Copper and Nickel in Steels. (In Russian.) A. G. Stromberg, R. V. Dityatkovskaya, and N. V. Milovanova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 919-925.

Absorption of copper and nickel by ferric hydroxide precipitated with ammonia was investigated. On the basis of data obtained, a method for the determination is proposed. Application on industrial scale showed satisfactory results.

10b-73. Nephelometrische Schwefelbestimmungen in Eisen und Stahl. (A Nephelometric Method for Determining Sulphur in Iron and Steel.) G. Geuer. *Schweizer Archiv fuer angewandte Wissenschaft und Technik,* v. 14, Sept. 1948, p. 275-278.

Method based on the measurement of turbidity caused by the reaction of H_2SO_3 with the acetates of lead and sodium. The method, and typical results. 11 ref.

10b-74. The Determination of Copper in Carbon and Low-Alloy Steels. *Metallurgia,* v. 38, Oct. 1948, p. 342-345.

The principle involved depends upon sulphide separation of the copper, ignition, and solution in nitric and sulphuric acids, followed by iodometric titration.

10b-75. The Determination of Silicon and Manganese in Iron and Steel. *Metallurgia,* v. 38, Oct. 1948, p. 346-352.

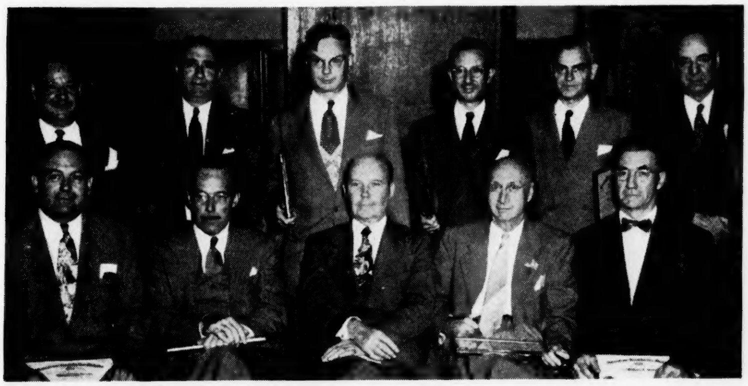
Methods submitted as recommended standard procedures to the British Standards Institution. The silicon method is based on perchloric acid dehydration, and the manganese method on zinc oxide separation of the Fe-Cr group and determination by ferrous sulphate and potassium dichromate titration following silver nitrate-ammonium persulphate oxidation.

10b-76. Rapid Estimation of Slag Basicity. W. A. Smith, J. Monaghan, and W. Hay. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 121-130.

Experiments were made on the

(Turn to page 28)

New Jersey Awards Silver Certificates



Silver Certificates Were Awarded for 25-Year Memberships in A.S.M. at the New Jersey Chapter Meeting on Sept. 20. In the photograph, (left to right, bottom row) are Richard W. Thorne (1923), treasurer, New Jersey Chapter; Joseph B. Shelby (1922); Francis B. Foley, A.S.M. national president, who delivered the technical lecture during the evening; Harry D. McKinney (1918), past national treasurer, past national trustee, past chairman of the New Jersey Chapter, and longest A.S.M. member; Willard L. Hults (1921), a past chapter chairman. Top row, left to right, are National Secretary William H. Eisenman; George S. Longley, Jr. (1923), George H. Bierman (1920), Norman L. Deuble (1922), Bishop Clements (1923), and H. M. German (1922). Not present were A. A. Hassan, Jr. (1923), James H. Heath (1923) and Warren A. Quadenfield (1920). (Reported by R. A. Grange, U. S. Steel Research Labs)

Fatigue Failures in Ship Tailshafts Traced To Surface Defects

Reported by John W. Sweet
Chief Metallurgist, Boeing Airplane Co.

Fatigue failure in tailshafts of large ships is a problem constantly facing the consulting metallurgist in the marine field, according to L. T. Holt, president of the L. T. Holt Co., Seattle. Mr. Holt is one of the Pacific Northwest's pioneer consulting physical metallurgists; he spoke before the Puget Sound Chapter A.S.M. at the October meeting on "Investigation Into the Failure of Machine and Engine Parts." The subject was covered by a series of slides showing actual failures investigated by the L. T. Holt Co.

In most premature fatigue failures of tailshafts the nucleus could be traced to the rough machined surface of the shafting. Keyways were also shown to be the point of origination of many fatigue cracks.

The steel itself was seldom found to be the source of the trouble. Fabrication or design defects were usually responsible for service failures. Mr. Holt showed one example where dirty steel was responsible.

Two motion pictures on the manufacture of steel were presented. One, by Allegheny Ludlum Steel Co., showed the melting and casting of stainless steel. The other illustrated the melting and fabrication of steel for ship shafting by Isaacson Iron Works of Seattle. The pictures brought to a conclusion a worthwhile evening.

Precision Mass Production Seen in Optical Plant Visit

Reported by O. R. Kerst
Sales Representative, E. F. Houghton & Co.

Members and guests of Worcester Chapter A.S.M. gathered at the plant of the American Optical Co., Southbridge, Mass., on Oct. 13 for a conducted tour. All who made the trip were thoroughly impressed with the mass production of a precision article, produced to extremely close tolerances and in infinite variations of types.

In the evening, a very delicious buffet supper was served at the Cohasse Country Club. Samuel T. Sheard, general manager of the Lensdale Plant of American Optical Co., gave a short coffee talk on present day management-labor policies of the company.

O. R. Kerst, vice-chairman of Worcester Chapter, then introduced Louis F. Rowe, manager of scientific and quality control at American Optical Co., who explained what had been seen during the plant visitation and answered many questions. Mr. Rowe pointed out the dependence on metallurgical development and cited many problems that will, in the future, have to be solved through the medium of metallurgical research. The permissible tolerances in lens generating and polishing are minute as compared to even accurate metalworking and the whole operation constitutes a modern mass-production marvel.

Bases for Selection Of Heat Treating Alloy Steel Defined

Reported by Robert T. Hook
Assistant Metallurgist
Warner & Swasey Co.

Calculations for the prediction of hardening and tempering behavior form a basis for the selection of alloy steels and their heat treatment, Walter Crafts, chief metallurgist of the Union Carbide and Carbon Research Laboratories, Inc., demonstrated in a talk before the Cleveland Chapter A.S.M. on Oct. 4.

For the purpose of such calculations, Mr. Crafts defined service requirements with respect to conventionally determined mechanical properties, such as tensile strength, fatigue strength, proportional limit and yield strength, elongation and reduction of area, and impact strength. The mechanical properties are affected not only by the degree of hardening in quenching, but also by the character of the partially hardened microstructure, as well as the degree of tempering and the influences of specific alloy composition and grain size.

These relations have been clarified to such a degree that suitable tempering treatments may be defined and minimum degrees of hardenability may be specified to develop the desired combinations of properties. Selection of the most desirable steel from a number of suitable grades then depends on the evaluation of initial cost of the steel and special difficulties involved in manufacture of the article.

Since impact strength is usually the most critical criterion of suitable mechanical properties, a typical scheme for selection is based on tensile strength, impact strength, and initial steel cost. The specific influences of individual alloying elements in different types of steels that meet the basic requirements may then be compared in the light of the intangible factors of machining, quench cracking, reliability, and serviceability, that control selection after the minimum requirements are satisfied.

pH method of estimating slag basicity. Examination of all relevant factors failed to improve accuracy. A new method was developed in which specific conductance of the water extract is measured and related to the $CaO/(SiO_2 + P_2O_5)$ ratio of the slag. On homogeneous slags this ratio can be estimated within ± 0.15 in a little over 20 min. The method is affected by the presence of undissolved lime in the sample, but is reliable when the sample is homogeneous.

10b-77. Rapid Determination of Carbon Content in Steels. P. A. Haythorne and Burton R. Payne, Jr. *American Machinist,* v. 92, Nov. 18, 1948, p. 124-125.

How discrepancies in heat treatment of particular lots of parts can be accounted for by determining carbon content from maximum hardness by means of a curve.

10b-78. Shop Tests for Identifying Cast Irons. *American Machinist,* v. 92, Nov. 18, 1948, p. 143.

10c—Nonferrous

10c-84. Titanium; Polarographic Determination in Clays and Clay Products. Donald F. Adams. *Analytical Chemistry,* v. 20, Oct. 1948, p. 891-895.

Effects of various factors.

10c-85. Electrolytic and Polarographic Determination of Zinc in Thorium. James H. Patterson and Charles V. Banks. *Analytical Chemistry,* v. 20, Oct. 1948, p. 897-900.

Previously abstracted from *U. S. Atomic Energy Commission,* MDDC-1708, Dec. 29, 1947. See item 10c-29, 1948.

10c-86. Precision Determination of Lead in High Grade Copper; Dithizone Color and Electrodeposition Gravimetric Methods. Louis Silverman. *Analytical Chemistry,* v. 20, Oct. 1948, p. 906-909.

Techniques used. 11 ref.

10c-87. Analysis of Cemented Carbide Compositions. *Analytical Chemistry,* v. 20, Oct. 1948, p. 989.

W. C. Bowden reports disagreement between procedure described by W. O. Touhey and J. C. Redmond (v. 20, 1948, p. 202-206) and his analytical results obtained on cemented-carbide alloys. The latter authors reply to the points raised; and, as a result of further experiments, modify their original procedure.

10c-88. Colorimetric Determination of Small Quantities of Antimony in Copper and Tin Bronzes. (In Russian.) E. I. Nikitina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 933-935.

Method is based on determination of the yellow complex $KSbI_4$ in H_2SO_4 solution in the presence of ascorbic acid.

10c-89. The Determination of Zinc in the Presence of Uranium. J. R. McCoy and S. M. Tuthill. *U. S. Atomic Energy Commission,* AECD-2180, 1947, 11 pages.

A procedure for determining zinc in uranium tetrafluoride and in pitchblende by means of dithizone. With this procedure it is possible to determine as little as one microgram of zinc. The procedure includes a method for the elimination of nickel and lead.

10c-90. Application of Aromatic Compounds of Arsenic in Chemical Analysis. I. (no subtitle.) II. Arsonate Method for Determination of Cobalt. III. Determination of Lead in the Presence of Alkaline-Earth Metals. (In Russian.) A. I. Portnov. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 18(80), April 1948, p. 594-607.

Dissociation constants of several of the compounds were determined, including effects of substituents. 29 ref.

10c-91. A Study of Some Chemical Reactions Employed in Photometric Analysis. H. C. Davis and A. Bacon. *Journal of the Society of Chemical Industry,* v. 67, Aug. 1948, p. 316-331.

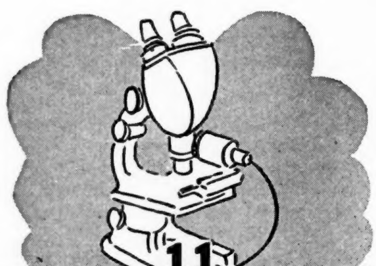
A number of the chemical reactions employed in photometric analysis for the determination of Si, Mn, Cr, Ni, V, Ti, Cu, Fe, and Mo. The influence of a large number of variables was studied in order to establish optimum conditions.

10c-92. The Influence of Basicity Upon the Efficiency of Oxidation/Hydrolysis Procedures for the Separation and Purification of Cerium. R. C. Vickery. *Journal of the Society of Chemical Industry,* v. 67, Aug. 1948, p. 333-336.

Results of a study of several methods. 10 ref.

For additional annotations indexed in other sections, see:

2b-194; 8-235



11 APPARATUS, INSTRUMENTS and METHODS

11-259. An Extruding Die for Powdered X-Ray Diffraction Specimens. M. Grotenhuis, G. F. Durst, and A. G. Barkow. *Non-Destructive Testing,* v. 7. Summer 1948, p. 15-18.

Techniques of its use. Results, obtained using three general techniques.

11-260. The Analysis of Industrial Problems; Coordinated Spectroscopy and X-Ray Diffraction. Wm. J. Poehlman and W. A. Kluck. *Non-Destructive Testing,* v. 7, Summer 1948, p. 19-22.

Examples of typical problems showing the application of spectroscopy, X-ray diffraction, and the combination of both methods.

11-261. On the Extinction-Coefficient: Particle Size Relationship for Fine Mineral Powders. H. E. Rose and C. C. J. French. *Journal of the Society of Chemical Industry,* v. 67, July 1948, p. 283-289.

Researches on measurement of the size characteristics of mineral powders by photo-extinction methods which have led to an experimentally derived curve relating the extinction coefficient for a suspension to the size of particle of the material in suspension, for the size range 0 to 50 microns. 15 ref.

11-262. La diffusion des Rayons X par un alliage partiellement ordonné. (Diffusion of X-Rays by a Partially-Ordered Alloy Lattice.) A. Guinier and R. Griffoul. *Acta Crystallographica,* v. 1, Sept. 1948, p. 188-193.

The diffuse reflections from a partially ordered lattice were computed, for a special case, in terms of a single parameter, the degree of short-range order. In the case of a three-dimensional lattice the results obtained are applicable only in particular cases; in general, it is necessary to specify the degree of both short and long-range order. 10 ref.

11-263. Electron Microscope Goniometry. A. F. Kirkpatrick and Evelyn Gagnon Davis. *Analytical Chemistry,* v. 20, Oct. 1948, p. 965-968.

The frequent occurrence of unknown crystals in electron microscopical samples presents an identification problem. How to use silhouette angles for this purpose.

11-264. Instrumentation. Ralph H. Muller. *Analytical Chemistry,* v. 20, Oct. 1948, p. 29A-30A.

Construction and operation of new type of balance made in Switzerland, but commercially available in the U. S. The balance has but one pan and all weighings are made under constant load because weights are removed, not added, as required by the sample.

11-265. Cleavage Patterns Disclose "Toughness" of Metals. C. A. Zapffe, C. O. Worden, Jr., and F. K. Landgraf, Jr. *Science,* v. 108, Oct. 22, 1948, p. 440-441.

Cleavage patterns studied by fractography contain features directly related to the "toughness" of the crystal. Two fractographs show patterns of "toughness" and two show "weakness."

11-266. Roughness of Surfaces. W. A. Tuplin. *British Science News,* v. 1, 1948, p. 18-20.

Measuring the roughness of surfaces by use of a stylus which traverses the work.

11-267. La identificazione metallografica del piombo negli acciai. (Metallographic Identification of Lead in Steel.) Luigi Cocciolo. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 74-75.

A special etching agent permitting the identification of lead inclusions in high speed steels. Composition of this reagent and method of use.

11-268. Discontinuité d'absorption K de rayons X du cuivre dans les alliages aluminium-cuivre aux différents stades de précipitation. (Discontinuity of the K-Line X-Ray Absorption of Copper in Al-Cu Alloys at Different Stages of Precipitation.) Adrienne R. Weill. *Comptes Rendus,* v. 227, July 19, 1948, p. 202-204.

11-269. Simple Gnomonic Projector for X-Ray Lauegrams. Samuel G. Gordon. *American Mineralogist,* v. 33, Sept.-Oct. 1948, p. 634-638.

11-270. A Simple Device for Calculating X-Ray Structure Factors. V. Vand. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 352.

Homemade slide-rule-type device and method of use.

11-271. The Testing of Brass and Other Constructional Materials for Ferromagnetic Impurities. J. R. Barker. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 363-364.

A torsion-balance magnetometer is simply and rapidly made. The effects of specimen shape and some data relating iron content and magnetic permeability of brass.

11-272. Transducers for Measuring Mechanical Displacements. *Electrical Manufacturing,* v. 42, Nov. 1948, p. 122, 124, 126.

Two recently developed methods — a mechanical system with excep-

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Two Presidents Chat With Local Leaders

The Cameraman Caught an Animated Discussion Between Presidents and Chapter Officers at Philadelphia's National Officers' Night. Left to right are H. K. Work, incoming president of A. S. M.; Francis B. Foley, retiring president; Edgar K. Spring, chapter treasurer; and William J. DeMauriac, chairman of the Philadelphia Chapter

Corrosion Symposium Features Officers' Night

Reported by Howard J. Godfrey*
John A. Roebling's Sons Co.

National Officer's Night on Oct. 22 was the big event of the Philadelphia Chapter's yearly program, with President Francis B. Foley making his last formal address as national president, and with H. K. Work addressing his first chapter as the new president-elect.

Chapter Chairman William J. DeMauriac directed the many interesting highlights of the meeting, which included the presentation of a 25-year certificate to President Foley by Francis G. Tatnall. Among the honored guests at the meeting were past national presidents Bradley Stoughton and William B. Coleman, along with National Secretary Bill Eisenman, who gave an entertaining talk relating to his experiences with past presidents.

Mr. Foley's address on the development of alloy steel preceded the main technical program, which was a symposium on "Material for Corrosive Service". M. G. Fontana, A. W. Tracey, and F. L. LaQue, three of the leading corrosion experts in the United States, presented various aspects of this subject.

Dr. Fontana, chairman of the department of metallurgy at Ohio State University, discussed causes and prevention of intergranular corrosion.

Mr. Tracey, who is in charge of the corrosion research laboratory of the American Brass Co., talked principally on the pitting and dezincification of brasses. The speaker reported that the dezincification of brass can be prevented by the use of arsenic and antimony.

Mr. LaQue, who is in charge of the corrosion engineering section, development and research division of the International Nickel Co., presented considerable data on the effect of stress on corrosion. The speaker showed that there is little difference, if any, in the corrosive effects on stressed and unstressed specimens.

*The chapter reporter is indebted to E. A. Suverkrop, development engineer of the John A. Roebling's Sons Co., for obtaining the information for this report.

Cullen Traces History of Controlled Atmospheres

Reported by F. B. Allen
Industrial Engineer
Remington-Rand, Inc.

A thorough and fascinating history of all the aspects of controlled atmospheres introduced a talk on this subject by O. Cullen, chief metallurgist, Surface Combustion Corp., before the October meeting of the Southern Tier Chapter A.S.M. A record-breaking attendance heard Mr. Cullen trace the problems from the early days of the blacksmith at his forge using coal or coke, through the many discouragements and failures, until modern controlled atmosphere equipment and processes have now given the metallurgist and heat treater remarkable control over most of his problems.

Muffle furnaces were probably the first of the controlled atmosphere type, Mr. Cullen pointed out. Here, the span was limited by the excessive weight, and radiant tube heating became most prominent.

Atmosphere gas generators were also discussed, and Mr. Cullen stressed the importance of dew point control. His talk was further illustrated with slides of charts, tables, graphs and microstructures.

New Sources for Vanadium, Uranium Being Sought

Reported by R. E. Christin
Chief Metallurgist
Columbus Bolt & Forging Co.

Unknown and untapped sources of uranium and vanadium oxide are being intensively sought, according to Prof. Dana J. Demorest of Ohio State University, speaking before the Columbus Chapter A.S.M. The speaker was able to give a close view of the vanadium and uranium resources of Colorado and Utah and the methods of extraction of these metals.

Uranium, in B.A.B. (before atom bombs), was only used in coloring of ceramics, while its supply at present, of course, is of extreme importance to the Atomic Energy Commission.

Uranium is always present in vanadiferous ores such as the carnotite-type and roscoelite-type vanadium-uranium ores of the Colorado plateau. These closely related ore types are apparently important only in this country, but at best they are quite inferior to the high-grade ores as a source of uranium. Hence American miners are being urged to find and produce uranium in this country.

If, by the demand for uranium, vanadium can be obtained for less than $2 per lb., the steel companies will be employing vanadium in steel sheets to prevent aging effects, Professor Demorest predicted. The ratio of vanadium pentoxide to uranium in these ores is quite variable, in many instances reaching a proportion greater than 6:1; yet vanadium sells for one-tenth the price of uranium. The United States can encourage the extraction of uranium from the ores by boosting the price to the miners for their efforts.

C.S.M. Plans Engineers' Day

The 15th annual Engineers' Day of the Colorado School of Mines will be held in Golden, Colo., on Friday, April 22, 1949. The program will feature speakers on many phases of the mineral industries, as well as exhibits and scholarship examinations.

Exhibition space, both indoors and out, is available, free of charge, to all industries engaged in or related to the discovery, extraction, and refining of minerals and petroleum. Complete information may be obtained by writing J. Robert Medaris, chairman of the Engineers' Day Committee, Golden, Colo.

tional sensitivity and an electrical method operating with little or no external actuating force—and their applications. With the first, displacements as small as 0.00001-in. can be easily measured without the aid of amplifying devices.

11-273. The Measurement of the Magnetic Properties of Non-Ferrous Metals. Zd. Trnka. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 409. Translated and abstracted from *Elektrotechnicky Obzor,* v. 36, Aug. 27, 1947, p. 305-306.

Accurate method described.

11-274. Divergent Beam X-Ray Photography with Standard Diffraction Equipment. A. H. Geisler, J. K. Hill, and J. B. Newkirk. *Journal of Applied Physics,* v. 19, Nov. 1948, p. 1041-1049.

New method for preparing divergent beam X-ray photographs of crystals. It employs the usual Laue transmission camera and a collimated primary beam of X-rays. Fluorescent radiation originating either in the crystal sample or at a radiator in front of the crystal is used as the source of divergent X-rays. Some applications to determinations of orientation, lattice parameters, and crystal perfection.

INSPECTION and STANDARDIZATION

12a—General

12a-109. Non-Destructive Testing in the Design, Manufacture and Evaluation of Naval Ordnance. Leslie W. Ball. *Non-Destructive Testing,* v. 7, Summer 1948, p. 7-14.

With special reference to the work of the U. S. Naval Ordnance Laboratory. Work done there.

12a-110. Plain and Tapered Rings and Plugs, Precision Measurement of Circularity, Concentricity and Straightness. M. J. Puttock. *Machinery* (London), v. 73, Oct. 7, 1948, p. 533-535.

New devices developed give accuracies of 0.00001 in. circularity, 0.000015 in. concentricity, 0.00001 in. straightness, and 0.000015 in. parallelism.

12a-111. Ultrasonic Thickness Indicator. Benson Carlin. *Electronics,* v. 21, Nov. 1948, p. 76-79.

Nondestructive testing and gaging device which gives visual display. Equipment comprises motor-driven variable frequency oscillator, contactor-initiated R-C sweep, crystal transducer, and cathode-ray tube Graduated screens provide direct readings.

12a-112. Colored Magnetic Powders for the Inspection of Obscure Parts by the Suspension Method. (In Russian.) A. V. Zhigadlo. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, Aug. 1948, p. 942-948.

Improvements in the method of inspecting finished and semifinished metal parts by the use of light-colored magnetic powders retained on the surface by oil-base resins or lacquers.

12a-113. A Comparator for Measuring the Diameters of Small Holes. E. R. Dymott and W. O. Jennings. *Machinery* (London), v. 73, Oct. 31, 1948, p. 590-591.

Apparatus measures the diameters of ring gages and holes from 0.5 in. down to 0.1 in. by comparison with slip gages. It has been found to give results accurate to ± 0.00003 in.

12a-114. Production Inspection of Valve Parts. *Tool & Die Journal,* v. 14, Nov. 1948, p. 50, 52-54.

12a-115. Tools for Dimensional Quality Control. O. H. Somers. *Tool Engineer,* v. 21, Nov. 1948, p. 31-32.

Principles.

12a-116. Quality Control Fundamentals. Bruno A. Moski, Jr. *Factory Management and Maintenance,* v. 106, Nov. 1948, p. 136, 138.

In summary form.

12b—Ferrous

12b-66. Use of Filters in Million-Volt Radiography. G. M. Corney. *Non-Destructive Testing,* v. 7, Summer 1948, p. 23-28.

Steel samples of thicknesses varying from ½ to 4 in. were radiographed using lead filters varying from 0.015 to ¼ in. thick. Advantages and disadvantages.

12b-67. Sensitivity and Exposure Graphs for Radium Radiography. H. E. Johns and C. Garrett. *Canadian Journal of Research,* v. 26, sec. A, Sept. 1948, p. 292-305.

Radiography of steel by gamma rays from radium. Thickness of lead front screen which yields the maximum intensifying effect; action of the front screen. Sensitivity curves were obtained using a slotted-wedge steel penetrameter for a number of the commonly used types of X-ray film.

12b-68. Tentative Hardenability Bands, 8745 H to 9445 H. *Metal Progress,* v. 54, Oct. 1948, p. 488-B.

12b-69. Optical Projector for Pipe Inspection; Sixth Progress Report on Non-Destructive Testing of Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, and T. P. Nordin. *Drilling Contractor,* v. 4, Oct. 15, 1948, p. 84-86.

Device which provides a full-size image of the internal surface of oil-well drill pipe, which may be viewed binocularly at a comfortable viewing distance.

12b-70. "H" Band Hardenability Specifications Favorably Received by Users of Automotive Alloy Steels. *Steel,* v. 123, Nov. 1, 1948, p. 81, 120, 122.

Good practical results after 3½-years experience with S.A.E-A.I.S.I. method of ordering steels by hardenability as well as by chemical analysis.

12b-71. The Measurement of Errors in Gears for Turbine Reduction Drives. C. Timms. *Institution of Mechanical Engineers, Proceedings,* War Emergency Issue No. 35, 1947, p. 418-432; discussion, p. 432-451.

The relationship between these errors and the inaccuracies of gear-hobbing machines and gear-cutting hobs. Improvements which have taken place in the accuracy of these machines and cutting tools resulting from applications of the test methods described.

12b-72. Inspecting Oldsmobile's New V-Eight Engine. S. C. Starnaman. *Machinery,* v. 55, Nov. 1948, p. 184-193.

Unique inspection machines which automatically gage cylinder bores and pistons, simultaneously classifying them for selective assembly. Highest quality is insured without sacrificing mass production of the new high-compression engine.

12b-73. Cutting Piston Inspection Costs in Half. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 40.

Continuous, high-speed, automatic method for magnetic inspection of pistons. The system will be also applied to other parts.

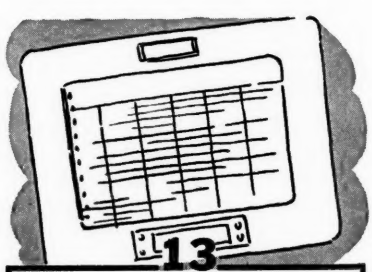
12b-74. Specifications for High Tensile-Strength Music Spring Wire. *Machinery* (American), v. 55, Nov. 1948, p. 271.

12b-75. Standard Grades of Pig Iron; American Iron and Steel Institute. (Continued.) *Foundry,* v. 76. Nov. 1948, p. 125-126.

Compositions for several classes of low and high-phosphorus pig iron. (To be continued.)

For additional annotations indexed in other sections, see:

20a-413; 20b-91; 24a-214; 27a-147-151; 27b-45.



TEMPERATURE MEASUREMENT and CONTROL

13-44. The Function of Open Hearth Instruments. II. (Concluded). G. Reginald Bashforth. *British Steelmaker,* v. 14, Oct. 1948, p. 466-468.

Regenerator temperatures and roof-temperature control.

13-45. A Simple Temperature Controller. J. C. Mouzon. *Review of Scientific Instruments,* v. 19, Oct. 1948, p. 659-662.

A controller developed for the housing of a low-temperature radiation pyrometer incorporates "proportional" control action. Utilizing a resistance thermometer element, its precision of operation is determined ultimately by the stability of the resistance element and the gain of the amplifier. Its operation is essentially independent of line voltage.

13-46. Photoelectric Pyrometer of Rapid Response. M. H. Roberts. *Journal of Scientific Instruments and of Physics in Industry,* v. 25, Oct. 1948, p. 337-339.

High-frequency induction heating applied to the hardening of high speed steel tools requires accurate temperature control, for which the usual types of pyrometer are unsuitable because of the rapidity of heating. A photoelectric cell of the emission type is therefore used with an interrupter in the optical path to avoid the difficulties of amplifying direct current. Output may be shown on an indicator or recorder in addition to operating a relay giv-

(Turn to page 32)

Corrosion of Metals Takes 10 Billion Dollar Toll Annually

Reported by George Birdsall
Reynolds Metals Co.

Corrosion is important to every fabricator or user of metals because it takes a toll of more than 10 billion dollars annually, Kenneth C. Compton of the Bell Telephone Laboratories said, in addressing the Louisville Chapter A.S.M. at its first meeting of the season on Oct. 5. This would run many times higher if preventive and protective coatings were not employed, he pointed out.

Studies have revealed that practically all corrosion results from electrochemical action. Since many factors can influence that action, there are many degrees and types of corrosion. If the two metals are close to each other in the electromotive series, corrosion will be minimum; maximum if at opposite ends of the series. If the electrolyte (liquid) happens to be a poor conductor of electricity (such as nearly pure water), corrosion will be less than if it is a good conductor (such as sulphuric acid). If the metal contacting points are dry most of the time, corrosion will be much less than if moist for an extended period of time.

These requirements for good electrolytic reaction automatically suggest means for preventing or minimizing corrosion. Thus, corrosion can be controlled by coating or electroplating. Keeping the metal surfaces dry will also help. Separating the metal parts so they are not connected electrically will prevent current flow and thus aid corrosion prevention.

In addition to simple electrochemical attack, there are various other forms of corrosion. Stray electric currents in the ground will produce electrolysis and subsequent attack on buried metal parts.

Stress-corrosion is another form. Impingement corrosion results where circulating liquids tear away protective films. Cavitation corrosion, a similar phenomenon, occurs where rapidly moving parts handle liquids. Fretting corrosion is set up by repeated changes in pressure (vibration) occurring in long overland transit of automobiles in freight cars; bearings on these new cars will exhibit this type of corrosion. In marine applications, small differences in concentration of chemicals present may produce electrochemical attack.

Methods of controlling corrosion involve covering the exposed or contacting surfaces with natural or manmade protective coatings. Two thin electroplates are much more effective than a single thick one if the right combinations are used. Organic paints, plastics, slushing compounds, hot bituminous coatings and waxes all afford various degrees of protection.

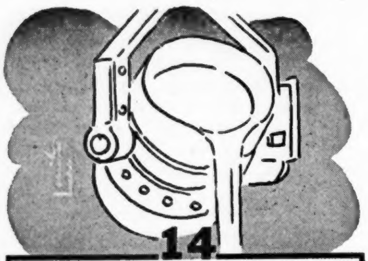
The rate of corrosion will vary greatly with different atmospheres. For example, zinc-coated steel poleline hardware exposed at Steubenville, Ohio, will become rusty in two years. The same material is good for 35 years at Portland, Ore. The difference is explained by the fact that the large amount of rain in the Portland area continually washes the parts so corrosive elements have no chance to accumulate.

Prior to Mr. Compton's lecture, the 120 members and guests present viewed the sound-color movie, "Jet Propulsion", presented through courtesy of Reynolds Metals Co.

Pueblo Reports Job Changes

The death of R. R. Robinson, engineer of sections for the Colorado Fuel and Iron Corp., Pueblo, Colo., has caused the following changes: Uly D. Collins is now engineer of sections, and Howell N. Drummond is his assistant. Mr. Drummond is chairman of the Pueblo Group, Rocky Mountain Chapter. The section engineering department is now under the supervision of Irving L. Herts, a former Pueblo Group chairman.

ing automatic control. Such pyrometers are simple and inexpensive to construct, and should be applicable to many other problems.



14 FOUNDRY PRACTICE

14a—General

14a-167. Gases Given Off by Core Binders. Hiram Brown. *Foundry,* v. 76, Nov. 1948, p. 84-87, 244-245.

In second and concluding article, the gases given off by various binders during baking, and practical tests to determine the most suitable binder.

14a-168. Polystyrene in Centrifugal Casting. *Modern Plastics,* v. 26, Nov. 1948, p. 112-115.

Advantages of use of plastic material over wax in producing metal castings by the lost-wax process.

14a-169. Diesel Bearings Cast in Sheet-Steel Flasks. C. O. Donley. *American Machinist,* v. 92, Nov. 4, 1948, p. 89-91.

How split bearings are formed by pouring bronze liners into flask rings around the steel shells. Accurate machining and close inspection insure good results.

14a-170. Die Casting Die Design. Part II. Cores. H. K. Barton and James L. Erickson. *Tool & Die Journal,* v. 14, Nov. 1948, p. 64-66, 90.

(To be continued.)

14b—Ferrous

14b-109. The Cleaning of Steel Castings. A. B. Lloyd. *Foundry Trade Journal,* v. 85, Sept. 23, 1948, p. 289-296; Sept. 30, 1948, p. 313-316; discussion, p. 316-320.

Details concerning various methods and equipment for the cleaning of steel castings. Discussion of relative ease of removal of sand from various types. Final installment describes working conditions and dust removal.

14b-110. Mass Producing High Tensile Castings. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 94-97.

Production of meehanite castings.

14b-111. Casting Steel and Iron Rolls. *Foundry,* v. 76, Nov. 1948, p. 96-99, 199-200.

Procedures and equipment.

14b-112. Making a Turbine Casing for Hydro-Electric Plant. T. Rigby. *Foundry Trade Journal,* v. 85, Oct. 14, 1948, p. 359-363; discussion, p. 363-364, 367.

Procedures used to make above casting.

14b-113. Centrifugal Castings for Jet Engines. Nathaniel F. Silsbee. *Aero Digest,* v. 57, Nov. 1948, p. 47, 104-105.

Application of British Firth Vickers process to manufacture of stainless-steel circular engine components.

14b-114. Precision Castings; Production Methods for Steel and Cast Iron. Frank Hudson. *Iron and Steel,* v. 21, Oct. 1948, p. 427-430.

Precision castings can be made by at least four different methods; but, for steel, investment casting is the only one which is reasonably satisfactory. Details of this process. (To be concluded.)

14b-115. Patterns and Molding Methods for Steel Castings. John Howe Hall. *Foundry,* v. 76, Nov. 1948, p. 80-83, 212, 214, 216, 218, 220, 222, 224-226.

First of five articles describing available types of patterns, their selection, and molding methods to which each is best adapted. (To be continued.)

14d—Light Metals

14d-56. Aluminum Alloy Pressure Molding—Prodigy of Die Casting. James L. Erickson. *Light Metal Age,* v. 6, Oct. 1948, p. 14-17, 29, 33.

Superior mechanical properties in comparison with other types of Al-alloy castings, or even forgings. Why this superiority exists and comparative data for mechanical, physical, and electrical properties of the various types. Gray irons, malleable irons, Mg alloys, Zn-base castings, and Cu-base castings.

14d-57. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 76, Nov. 1948, p. 88-89, 188-190, 192, 194.

Common defects encountered in aluminum alloy castings and methods of correcting them. Twelfth and concluding article of a series based on a survey sponsored by the Foundry Division of the Aluminum Association.

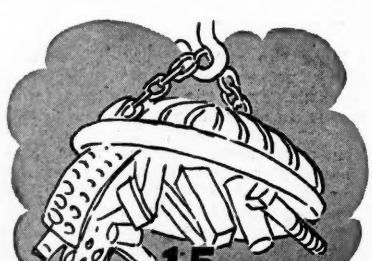
14d-58. Light Alloy Centrifugal Castings. David Basch. *Canadian Metals & Metallurgical Industries,* v. 11, Nov. 1948, p. 23, 32.

Research at the Canadian Bureau of Mines, Ottawa, sponsored by A.F.S. Test castings are 13-in. diam. wheels with spokes of varying thickness. Mechanical properties of test bars cut from these spokes.

14d-59. Dynaflow Rotors Cast in Plaster Molds. Chester Ricker. *American Machinist,* v. 92, Nov. 18, 1948, p. 120-123.

How the Antioch process, not to be confused with lost wax, provides a means of making intricate aluminum castings with smooth surfaces held to close tolerances.

For additional annotations indexed in other sections, see: 27c-17.



15 SCRAP and BYPRODUCT UTILIZATION

15a—General

15a-16. Metallurgical Treatment of Chips and Borings. Part I. Sources of Material, Drying, De-Oiling, Iron Removal and Briquetting. Part II. Briquetting, Baling Separation and Crucible Melting. Edmund R. Thews. *Canadian Metals & Metallurgical Industries,* v. 11, Oct. 1948, p. 23-24, 30, 32, 35; Nov. 1948, p. 24, 27-28, 30.

Recommended methods for handling this type of scrap and preparing it for remelting.

15b—Ferrous

15b-55. La soudure appliquée a la réparation des batis de presse. (Welding as Applied to the Repair of Stamping Presses). M. Grenez. *Soudure et Techniques connexes,* v. 2, July-Aug. 1948, p. 170-173.

Methods applied to 100, 250, and 600-ton presses.

15b-56. 16" Coastal Defense Guns Yield to Cutting Torch. *Victor Weld,* v. 4, Oct. 1948, p. 9-11.

Salvage procedures.

15b-57. For More Efficient Production Check Your Maintenance Welding; This is How It's Done at Chevrolet's Gear & Axle Plant. L. H. Feeney. *Industry and Welding,* v. 21, Nov. 1948, p. 30-33, 87.

15b-58. Repairing Locomotive Frames. R. G. Swisher. *Welding Engineer,* v. 33, Nov. 1948, p. 60.

Broken frames can be repaired with a minimum of dismantling by arc welding.

15b-59. Salvaging Fifty-six Tons of Sheet Metal Per Day. *Machinery,* v. 55, Nov. 1948, p. 178-183.

Enough material is being salvaged to make an extra car in every 50.

15b-60. First of IHC Nation-Wide Chain of Truck Unit Rebuilding Plants. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 44-45.

Application of mass-production technique and assembly lines to rebuilding of International Harvester truck units at Richmond, Calif. Machining and inspection.

15b-61. Post-War Aristocrat: The Junkman. Edward B. Lockett. *Steelways,* Nov. 1948, p. 1-5.

The story of scrap iron and steel, from the junkman's wagon on one hand and the dismantling of battleships on the other, to the steel mills which convert this material into new steel once more.

15c—Nonferrous

15c-6. Zur Bergung und Verwertung von Altkupfer. (Salvage and Utilization of Scrap Copper.) H. Broking. *Metall,* Jan. 1948, p. 11-13.

Details of recommended methods for recovery of scrap copper, especially from the ruins of Europe, and its reuse. Flow diagram showing sorting into four types, processing steps for each, and use in combination with ore concentrates in the smelter.

15d—Light Metals

15d-12. Die Gewinnung und Verwertung der bei der Verhutting von Aluminiumschrott anfallenden Nebenprodukte. (Salvage and Utilization of By-Products From the Smelting of Aluminum Scrap.) Kurt Schneider. *Metall,* Feb. 1948, p. 35-37.

Methods of salvaging materials (such as lubricating oils, ball-mill dust, Al powder, grinding dust, salt slag and even paper) that are mixed with Al scrap.

Metallurgist Has Responsibility in Pricing Practice

Reported by G. F. Kappelt
Chief Metallurgist, Bell Aircraft Corp.

"Every condition that is added to the purchase order for steel has its effect upon the final price," said Thomas D. Taylor, metallurgical engineer, Bliss and Laughlin, Inc., addressing the Buffalo Chapter A.S.M. "The so-called 'extras' should only be specified if their effect upon the product is justified," he continued. Mr. Thomas opened the chapter's 1948-49 series of meetings with a talk on "Cold Finished Bar Steels and Their Application to Industrial Purposes."

Because of the present-day pricing practice, Mr. Taylor believes that the metallurgist has a direct responsibility to his company to review current and future designs from the standpoint of simplification of steel callouts. The simplification should be based not only on sizes but also on the types of steel available in the general location of the point of use.

In his introductory remarks, Mr. Taylor reviewed his early experience with the American Society for Steel Treating (predecessor of A.S.M.), and the valuable first-hand information he obtained from the various members of that society whose published works are now the Bibles of the industry. In this connection, Mr. Taylor reviewed many of the customary imperfections found in early wrought steel products and cited instances which illustrated the solution of these problems.

Structure of Cementite Clarified by Explanation Of Carbide-Forming Trends

Reported by Melvin R. Meyerson
National Bureau of Standards

In a talk entitled "Carbides and Nitrides in Steel", James B. Austin, director, research laboratories, U. S. Steel Corp., presented a clarification of the structure of cementite before the Washington Chapter A.S.M. on Oct. 11.

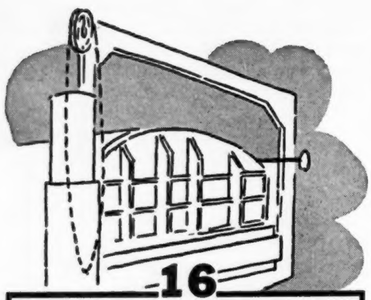
Dr. Austin showed how the iron in cementite may be replaced by alloying elements which are chemically similar to iron and whose atoms vary not more than 15% in size. The more important elements fitting the above requirements are manganese, chromium, molybdenum, tungsten, and vanadium.

However, the presence of a carbide-forming alloying element in steel is not the only factor which influences the types of carbide (whether alloy or iron) in a steel. The methods used to cool and anneal the steel are also of considerable importance. As an example, Dr. Austin cited a steel containing 2.2% manganese and 0.14% carbon; when heat treated to form pearlite, the extracted carbides contained 19% manganese. When the same steel was treated to form bainite the extracted carbide contained only 2½% manganese. The speaker illustrated the effects of carbide composition on the physical properties of alloy steel by giving data on thermal expansion, specific resistance, and others.

Dr. Austin also presented information on the replacement of the carbon atom in cementite. The chief requirement for replacement is for the replacing element to be of nearly the same size as carbon, and for this reason nitrogen is outstanding.

Film on Wire Rope Production

A new color-sound film entitled "Indian Paint" portrays the manufacture of wire rope and shows the making of steel from ore to finished product. Running time is 35 min. Arrangements can be made for showing the film by writing the Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division, Palmer, Mass.



16 FURNACES and HEATING DEVICES

16a—General

16a-97. Significance of Recent Improvements in High Speed Heating by the Gradiation Technique. Davidlee Von Ludwig. *Industrial Gas,* v. 27, Oct. 1948, p. 5-8, 28-32.

Technique and apparatus developed for controlling the rapid heating of metals with gaseous fuels. The heating panels are arranged so that their distance from the work is automatically varied to maintain the desired temperatures.

16a-98. Recent Developments in Industrial Uses of Gas. C. B. Phillips. *Industrial Gas,* v. 27, Oct. 1948, p. 16-17, 27-28.

Several new applications to metallurgical furnaces and ovens.

16a-99. Oil Standby Equipment Installed on Gas Furnaces. Paul Metzger. *Steel Processing,* v. 34, Oct. 1948, p. 558-559.

16a-100. Contribution a l'étude des connexions soumises a des chauffages répétés. (The Problem of Electrical Connections Subject to Repeated Heating.) Jean Bernot. *Journal du Four Electrique et des Industries Electrochimiques,* v. 57, July-Aug. 1948, p. 82-85.

The above problem applies particularly to the points of attachment of metallic conductors to, for instance, silicon carbide electrodes. As a result of a theoretical analysis of the problem, a new method of calculation is proposed which makes it possible to predict the applicability of certain metals and alloys for joining heating elements.

16a-101. Sintering Furnaces and Atmospheres. H. C. Bostwick. *Industrial Heating,* v. 15, Oct. 1948, p. 1664-1666, 1668, 1670, 1672, 1674, 1676, 1678, 1831-1832.

Furnaces and auxiliary equipment for production of powdered-metal compacts.

16a-102. Combination Gas-Oil Burners Installed in Continuous Forging Furnaces. *Industrial Heating,* v. 15, Oct. 1948, p 1696, 1818.

Installation made to prevent shutdowns during periods of gas shortage.

16a-103. Combustion Safeguards Applied to Infra-Red Radiant Gas-Fired Incandescent Units. *Industrial Heating,* v. 15, Oct, 1948. p. 1698, 1839-1840.

Use of commercial device which, in case of pilot-flame failure or gas shut-off, closes the main valve of the burner, thus preventing possible explosions.

16a-104. Vertical Tower Oven With New Type Conveyor System. *Industrial Heating,* v. 15, Oct. 1948, p. 1788, 1790.

New type of oven designed to conserve floor space. Tower contains a gas-fired oven, through which the conveyer runs, and carries work which has been painted, to be baked, cured, or dried.

16a-105. Furnaces with "Leaky" Walls. W. Trinks. *Industrial Heating,* v. 15, Oct. 1948, p. 1795-1796, 1798.

Points out little-understood fact that the extra heat carried out of furnaces with leaky or permeable walls, when there is a positive pressure in the furnace, does not represent a waste of heat, or cause lowered efficiency, since the same gas would leave by way of the flues. Actually, true conduction loss is shown to be reduced slightly by leakage, because the temperature gradient is decreased, This idea has been applied commercially in England to several types of furnaces, in which an ejector is provided to pull the gases through the permeable walls, other flues not being necessary. Savings up to 35% in fuel are reported.

16a-106 Controlled-Atmosphere Electric Furnaces — Their Present State and Application. C. E. Peck. *Westinghouse Engineer,* v. 8, Nov. 1948, p. 162-166.

Compositions and costs of typical controlled furnace atmospheres, and atmospheres suitable for heat treatment of different metals.

16a-107. Split Type Electric Furnace for Galvanizing Baths. Wallace G. Imhoff. *Iron Age,* v. 162, Nov. 11, 1948, p. 114-115.

Sectional and ring-type furnaces, developed in Australia, which are especially designed to permit rapid and easy removal of the furnace from around the kettle. Other features are close and automatic temperature control and distributed heat input for optimum efficiency.

16a-108. Container Heating Methods and Their Efficiency as Applied on Extrusion Presses. Joseph Bronner. *Machinery Lloyd* (Overseas Edition), v. 20, Oct. 23, 1948, p. 72-75.

Refers to outer sections of extrusion presses. During extrusion, the equipment must be kept at the temperature of extrusion—250 to 500° C., depending on the metal being extruded. The various methods for applying this heat. Recommends use of a new type of internal heating using electrical heating elements. Advantages of high efficiency of heat utilization and smaller structural strains caused by temperature gradients.

16b—Ferrous

16b-96. Baking the Finish on Automobile Bodies. *Industrial Finishing,* v. 24, Oct. 1948, p. 124.

New Ford oven in which controlled convection and infrared heating are combined.

16b-97. Some Experiences With Soaking Pits. H. V. Flagg. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 59-63; discussion, p. 64-66.

Ten years of development in soaking-pit design and control.

16b-98. Combustion Control. H. Ziebolz. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 67-71.

Control and proportioning systems for use of air-oxygen mixtures in steel mill practice.

16b-99. Determinazione del profilo degli altiforni a coke. (Design of Blast Furnaces Using Coke.) Guido Danese. *La Metallurgia Italiana,* v. 40, March-April 1948, p. 54-70.

Factors involved are investigated from a theoretical point of view. 16 ref.

16b-100. High-Frequency Induction Heating of Steel Rods for Production of Bearing Shells by Stamping. (In Russian.) I. N. Chichilo and V. A. Sudarikov. *Promyshlennaya Energetika* (Industrial Power), v. 5, Aug. 1948, p. 10-11.

Use of high-frequency heating instead of conventional furnace heating to expedite production of bearing shells by the hot stamping process. Includes circuit diagram.

16b-101. Fuel Oil in Furnaces; Use in the Iron and Steel Fabricating Industry. M. Roddan. *Iron and Steel,* v. 21, Oct. 1948, p. 457-460. A condensation.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16b-87, 1948.

16b-102. Considerations in the Design of Alloy Support Mechanisms for Pit Type Furnaces. George C. McCormick. *Industrial Heating,* v. 15, Oct. 1948, p. 1709-1710, 1712, 1714, 1716, 1837-1838.

Design of several types of the above. Several improvements were made to prevent costly failures which had occurred while the devices were supporting parts being heat treated and quenched.

16b-103. New Slab Heating Furnace at Irvin Works. *Iron Age,* v. 162, Nov. 4, 1948, p. 118-120.

New furnace, installed at Irvin Works of Carnegie-Illinois Steel Corp. The unit, which is zone-controlled, triple-fired and continuous, will handle slabs 3 to 8 in. thick, 20 to 60 in. wide, 60 to 216 in. long.

16b-104. A Note on the Varying-Turbulence Cowper Stove; The Denain-Anzin Tests and the C.S.I. Standard Cowper Stove. Daniel Petit. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 131-138.

The two main principles of this blast-furnace stove. Detailed tests on a properly constructed stove are reported, results showing the usual efficiency test to be unsatisfactory and leading to a new and simple method for determining optimum operating conditions. Details of a standard Cowper stove especially designed for use with large-capacity blast furnaces.

16c—Nonferrous

16c-9. Fuel Factors in Non-Ferrous Fabrication. Leslie Aitchison. *Foundry Trade Journal,* v. 85, Oct. 14, 1948, p. 365-366. A condensation.

Previously abstracted from *Institute of Petroleum and Institute of Fuel, Joint Conference on Modern Applications of Liquid Fuels, Advance Copy,* 1948. See item 16c-6, 1948.

16d—Light Metals

16d-5. Neuartige elektrische Ofen zum Erschmelzen von Aluminiumabfällen und krätzen. (New Types of Electric Furnaces for Melting Aluminum Scrap.) E. Bertram. *Metall,* Jan. 1948, p. 1-6.

A comparative study of the efficiency and economy of different types of melting furnaces.

For additional annotations indexed in other sections, see:

2d-24; 18b-151; 27a-137.

Steel Hardenability Guarantees Offered By Mill and Jobber

Reported by W. J. Erichsen
Metallurgist, Westinghouse Electric Corp.

The usefulness of hardenability data for the selection and processing of steel parts was emphasized in a talk by C. D. D'Amico, manager, special steels division, Los Angeles plant of Joseph T. Ryerson and Son, Inc., before members of the Golden Gate Chapter A.S.M.

Dr. D'Amico pointed out that today, through the use of hardenability data, we can select the grade of steel best suited for a particular part, obtain the steel on the basis of the hardenability requirements of the part, lay out a suitable heat treating procedure in advance, and rest assured that the physical properties of the part will comply with those originally established.

The selection of the proper steel for a part of a given size will depend upon the maximum strength required and the heat treatment necessary to develop this strength. The load carried by the part fixes the size of the part and the strength required. The strength that can be developed by heat treatment is also a function of the size of the part, since parts of different sizes cool at different rates when quenched. The rate of cooling of the part determines the amount of alloy required to harden the steel to the desired degree throughout its cross section.

The maximum strength capable of being developed in a heat treated part, however, is controlled primarily by the carbon content.

Dr. D'Amico described in detail the Jominy hardenability test used as a method of measuring the hardness that can be developed when any particular grade of steel is subjected to wide ranges in cooling rate. He demonstrated the use of hardenability data to predict the hardness developed at the surface, center, and half radius of a certain sized part when quenched.

In addition to the as-quenched hardness values, the as-tempered hardness values may be predicted from the hardness obtained on the tempered Jominy bar. Thus, the tempering temperature necessary to obtain the final hardness required may be predicted.

Dr. D'Amico also discussed the grades of steel available to hardenability specifications from mills, the manner in which such steels may be ordered, and the standard hardenability bands tentatively established for each steel.

It was interesting to learn that alloy steel guaranteed to meet minimum hardenability limits is now available from warehouse stocks of several large jobbers. The data furnished by one national jobber include not only the as-quenched hardenability curve but as-tempered curves for tempering temperatures of 1000, 1100 and 1200° F. The availability of such steels from warehouses now makes it possible for small users of steel to benefit from the advantages of hardenability control which were heretofore passed along only to mill buyers.

Oregon Hears Theisinger

Reported by E. B. Clarke
Willamette Iron & Steel Co.

A joint meeting of the Orgeon Chapter A.S.M. was held with the American Welding Society for the purpose of hearing a lecture by William Theisinger of Lukens Steel Co. on "The Manufacture, Fabrication and Application of Clad Vessels". Dr. Theisinger gave a very informative and interesting talk, accompanied by pictures and sound film (that didn't sound). However, interest was quite general and a discussion period followed the lecture, in which many members took part.

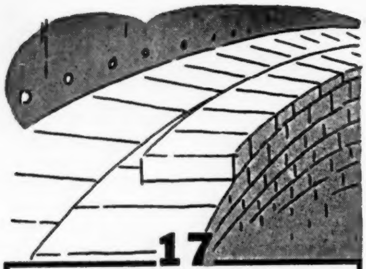
How up to date are you? Test yourself in quizz contest in January issue.

Croft Now Vice-Pres. Of Wheeling Bronze

Harry P. Croft, former director of technical control and research for Chase Brass & Copper Co., midwestern division, has been named vice-president in charge of development for Wheeling Bronze Casting Co., Wheeling and Moundsville, W. Va. Dr. Croft is a national trustee of the American Society for Metals, is active in various other technical societies, and is the author of papers on the properties and machinability of copper alloys.

H. P. Croft

He was graduated from Rensselaer Polytechnic Institute and received his Ph.D. degree in metallurgy at Case Institute of Technology in 1942. He served in World War I as an infantry private and was commissioned a colonel in World War II. In the early part of the war he served as copper consultant, Bureau of Conservation, Office of Production Management, Washington, and later, as chief of the industrial division, Cleveland Ordnance District.



17 REFRACTORIES and FURNACE MATERIALS

17-88. New Heat-Resistant Materials That Slash Process Costs. *Modern Industry,* v. 16, Oct. 15, 1948, p. 40, 42-45.

New refractories and new methods for improvement of old ones, as used in miscellaneous chemical and metallurgical processing units. Comparative data on new and old refractories.

17-89. How Ford Fixes Furnaces Faster. *Modern Industry,* v. 16, Oct. 15, 1948, p. 41.

Use of castable refractories which resist temperatures of 3000 to 3100° F.

17-90. Composition and Structure of Stalactites Formed Under Dinas Roofs of Openhearth Furnaces. (In Russian.) V. A. Bron. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the U.S.S.R.), v. 62, Sept. 1, 1948, p. 125-127.

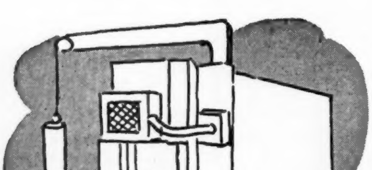
(Dinas is a type of silica refractory.)

17-91. An Untapped Refractories Market Lies in Ceramic Molds for Precision Casting. *Brick & Clay Record,* v. 113, Nov. 1948, p. 58, 60.

Need for this development.

For additional annotations indexed in other sections, see:

2b-193.



18 HEAT TREATMENT

18b—Ferrous

18b-148. Flame Hardening Methods and Techniques. J. R. Burg. *Welding Journal,* v. 27, Oct. 1948, p. 805-809.

Types of locomotive equipment that lend themselves to flame hardening. Why flame hardening is chosen rather than some other mode of surface hardening. Recommends use of equipment designed and built for specific jobs rather than makeshift adaptation of worn-out machine tools. Also recommends use of as many automatic features as possible.

18b-149. Hardening of Cast Iron Using High-Frequency Methods. (In Russian.) M. I. Shitov. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 23-25.

Recommends high-frequency hardening for obtaining gray iron having high wear resistance. Substitution of gray iron for steel in many cases is thus made possible.

18b-150. Steel Treatments; Practical Aspects of Isothermal Annealing, Austempering, Martempering and Deep Freezing. (Concluded.) J. Shaw. *Iron and Steel,* v. 21, Oct. 1948, p. 443-445.

Deals with martempering and deep freezing. 10 ref.

18b-151. High Frequency Induction Surface Hardening. Joseph F. Libsch. *Steel,* v. 123, Nov. 15, 1948, p. 97-102, 106.

Development of more efficient equipment, refinement of coil design, and better understanding of the metallurgical phenomena involved have extended use of the process during the past decade.

18b-152. Induction Hardening of Cold Rolls. G. W. Seulen and H. Kuhlbars. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 393-395. Condensed from *Iron and Coal Trades Review,* v. 156, June 4, 1948, p. 1159-1164.

New method and equipment for hardening the rolls used for the cold rolling of sheet or strip.

18b-153. Induction Speeds Production. R. A. Nielsen. *American Machinist,* v. 92, Nov. 18, 1948, p. 112-113.

Three typical jobs in which induction heating is used for brazing and hardening.

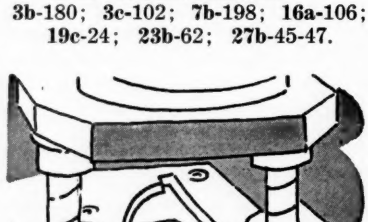
18d—Light Metals

18d-14. Conditions de recuit des alliages Al-Mg en métaux purs pour la décoration. (Conditions of Heat Treatment for Al-Mg Alloys Made From Pure Metals for Decorative Purposes.) J. Hérenguel and M. Scheidecker. *Métaux & Corrosion,* v. 23. July-Aug. 1948, p. 167-174.

Alloys should be treated to produce a fine-grained structure or perfectly homogenous solid solution prior to electrolytic polishing followed by surface treatment for specific decorative effects. Optimum conditions for heat treatment and hot and cold working to obtain the desired structure.

For additional annotations indexed in other sections, see:

3b-180; 3c-102; 7b-198; 16a-106; 19c-24; 23b-62; 27b-45-47.



19 WORKING

19a—General

19a-220. Manufacturing Versatility in Press Brakes. Cyril J. Bath. *Sheet Metal Worker,* v. 39, Oct. 1948, p. 40-41.

Some types made by Cyril J. Bath Co., Cleveland.

19a-221. Many Production Problems Solved with Versatile Notcher and Shearing Tool. *Sheet Metal Worker,* v. 39, Oct. 1948, p. 44-45, 48.

19a-222. The Sendzimir Cold Strip Mill. A. I. Nussbaum. *British Steelmaker,* v. 14, Oct. 1948, p. 458-462.

Described, diagrammed, and compared with conventional mills.

19a-223. German Practices in Drawing and Forging Turbine Blades. R. T. Willson. *Steel Processing,* v. 34, Oct. 1948, p. 545-548. Based on F.I.A.T. Reports No. 1129 and 1148.

19a-224. An Italian Process for the Production of Rod and Wire. *Wire Industry,* v. 15, Oct. 1948, p. 657.

Process and equipment for production of Pb, Al, Zn, or other wire directly from molten metal.

19a-225. Modern Cold Drawn Equipment. G. W. Garwig and A. L. Thurman. *Iron and Steel Engineer,* v. 5, Oct. 1948, p. 90-99; discussion, p. 99-100.

Various types of cold drawing equipment, including auxiliary and control apparatus.

19a-226. Plastic Bending Under Tension. H. W. Swift. *Engineering,* v. 166, Oct. 1, 1948, p. 333-335; Oct. 8, 1948, p. 357-359.

Thesis that plastic bending under super-imposed tensile stress inevitably produces thinning of the material, and that it is this thinning which is mainly responsible for the discrepancy between theory and practice in deep drawing. Second installment describes apparatus designed to bend strip metal up to 2 in. wide and up to 0.08 in. thick under controlled tension. Results obtained with aluminum, brass, and mild steel.

19a-227. Stamping Data. IV and V. *American Machinist,* v. 92, Oct. 21, 1948, p. 143, 145.

Presentation of diagrams showing practices followed by automobile manufacturers and agricultural implement makers and incorporated in their handbooks of engineering standards.

19a-228. West Coast Plant to Augment Supply of Electrolytic and Hot-Dip Cold Reduced Tin Plate. *Steel,* v. 123, Nov. 1, 1948, p. 100, 103-104, 106, 109-110.

New plant of Columbia Steel at Pittsburg, Calif.

19a-229. Gravity Pressure for Drawing Dies. Frederico Strasser. *Tool Engineer,* v. 21, Nov. 1948, p. 34-35.

A method for attaining diminishing pressure as the draw proceeds.

19a-230. Designing of "Trouble-Free" Dies. Part LXXXVI. Types of Presses, Their Uses and Capacities. C. W. Hinman. *Modern Industrial Press,* v. 10, Oct. 1948, p. 22, 24.

Dieing machines and high-speed blankers.

19a-231. Press Department Builds National Motor Bearing Company. J. Delamar Harrell. *Modern Industrial Press,* v. 10, Oct. 1948, p. 26, 28, 30.

Manufacture of oil-retention devices using a wide variety of types of mechanical presses.

19a-232. Novelty Clock Making at Cliff Stone Mfg. Co. Howard E. Jackson. *Modern Industrial Press,* v. 10, Oct. 1948, p. 32, 36, 38.

Use of shears and punch presses.

19a-233. How to Determine the Center of Cut in Dies. Federico Strasser. *Modern Industrial Press,* v. 10, Oct. 1948, p. 50, 52.

19a-234. Some Fundamental Considerations of the Deep Drawing of Metals. A. R. E. Singer. *Steel Processing,* v. 34, Oct. 1948, p. 530-533.

Logical planning of metallurgical research. Necessity of creating a working "model", mental or otherwise, of the process being investigated. The mechanism of deep drawing is analyzed for a simple

(Turn to page 38)

Testing Procedures Should Be Correlated To Materials Applications

Reported by H. A. McMahon
Manager, Planning and Scheduling Dept. Struthers Wells Corp.

Testing procedures should be correlated to the application of materials as they are used in industry, R. L. Templin maintained in addressing a district meeting of the Northwestern Pennsylvania Chapter A.S.M. on Oct. 21. Mr. Templin, who is assistant director of research for the Aluminum Co. of America, and president of the American Society for Testing Materials, spoke on "The Significance of Testing Procedures of Materials".

Mr. Templin referred particularly to the need for cooperation between supplier and user so that materials adequate for the loads in service might be furnished by the supplier, and so that they render the service for which they were placed in a given engineering structure.

The differences in test data obtained from both standardized and nonstandardized test procedures were pointed out and the factors causing such differences discussed in some detail. Standardized test procedures should be followed closely if satisfactory results are desired.

Mr. Templin brought out the need for uniform procedures in additional tests to cover workability, compression values and ductility—factors which can be used to advantage in the design of engineering structures.

He also emphasized the need for interpreting test data so that the information passed on will represent a true evaluation of the properties that are disclosed.

Metal Show Cartoon

Russia's Deputy Foreign Minister, Andrei Vishinsky, Is on the Receiving End of a Jibe in One of a Series of Cartoons Used by Lindberg Engineering Co. to Help Present Their Industrial Furnaces in Their Booth at the Recent National Metal Exposition in Philadelphia

case. The relationship of plastic deformation and mechanical properties of the metal. (To be continued.)

19a-235. Die Design for Symmetrical Brackets. Part II. Hans Effgen. *Tool & Die Journal,* v. 14, Nov. 1948, p. 58-60, 62.

Construction of two-station progressive dies for a third type of bracket and also a continuation of a general discussion of design theory as related to the case at hand.

19b—Ferrous

19b-130. Fabricating Hollow Steel Airplane Propellers. Arthur Q. Smith. *Industrial Gas,* v. 27, Oct. 1948, p. 14-15, 35-36.

Forming, welding, and annealing procedures and equipment.

19b-131. The West Gets a New Steel Mill. *Western Metals,* v. 6, Oct. 1948, p. 24-30.

Columbia Steel's new cold reduction plant. Plant layout and various pieces of equipment. Units for rolling, cold reduction, electrolytic cleaning and tinning, coil annealing, hot dip tinning, and trimming.

19b-132. Added Facilities Increase Republic's Stainless Steel Capacity. R. T. Willson. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1203-1206.

New cold reduction mills and auxiliary equipment.

19b-133. How Surface Peening Improves Metal Parts. Rick Mansell. *Steel Processing,* v. 34, Oct. 1948, p. 549-551, 556.

The mechanism of surface peening; how it is done commercially; and applications.

19b-134. Hoes for Export Produced at Hercules Forge. Thomas A. Dickinson. *Steel Processing,* v. 34, Oct. 1948, p. 552-553.

Equipment and procedures.

19b-135. Practice and Theory in Drawing Mild Steel. Nestor Piret. *Wire Industry,* v. 15, Oct. 1948, p. 665-667, 672.

A Dutch engineer presents practical formulas and graphs, resulting from theoretical analysis and data for a multihole accumulation-type machine. Calculated and measured power agree quite well.

19b-136. Republic's 44-36-32 in. Mills at Chicago. R. F. Lavette. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 37-40; discussion, p. 40-41.

Mills and their auxiliary equipment.

19b-137. Columbia Steel's New Sheet and Tin Mill. Paul F. Kohlhaas. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 42-58.

Layout for new mill in Pittsburg, Calif.

19b-138. Greater Forming Efficiency Provided by New Process. *Steel,* v. 123, Nov. 1, 1948, p. 92.

Forming of steel gas cylinders, upsetting sections of tubing to increase wall thickness, sealing tube ends, necking-down tube sections and other operations of a related nature on low-carbon or alloy steel, brass, and other metals with greater efficiency by a process utilizing a combination of electrical current and pressure.

19b-139. Large Plate-Bending Machine. *Engineer,* v. 186, Oct. 15, 1948, p. 399.

British three-roll machine, designed for bending stainless-steel plates up to 22 ft. long by 1 in. thick into complete cylinders.

19b-140. Hot Pressed Formed Parts for Heavy Construction. Herbert A. Ottey. *Product Engineering,* v. 19, Nov. 1948, p. 113-116.

Use, giving materials, tolerances, and typical applications. The relationship between the radius of curvature and the thickness of the material.

19b-141. Shot Peening. Effect of Shot Type on Spring Fatigue Life. Why Peening Calls for Uniform Shot. *SAE Journal,* v. 56, Nov. 1948, p. 36-39. Based on articles by F. P. Zimmerli and John Straub, respectively.

Original papers were presented at a recent meeting of the Shot Peening Division of the S.A.E. Iron and Steel Technical Committee.

19b-142. Building the Peacetime Jeep. William E. Paris. *Machinery,* v. 55, Nov. 1948, p. 194-201.

Outstanding forging, machining, and stamping operations employed.

19b-143. Wire-Drawing Speed Increased 25% by Use of Phosphate Lubricating Compound. *Steel,* v. 123, Nov. 8, 1948, p. 102, 132.

Use of amorphous metaphosphate known as "Banox".

19b-144. Drawing Stainless Milker Pails. Walter Ellingboe. *Iron Age,* v. 162, Nov. 11, 1948, p. 94-97.

Improved drawing properties and surface finish of stainless steel, improved die construction, better draw compounds, and other manufacturing refinements have reduced from five to four the number of draws and from two to one the number of bulging operations required in producing 50 and 70-lb. milker pails. Fewer anneals are also required.

19b-145. Modern Cold Forging Practice. J. H. Friedman. *Iron Age,* v. 162, Nov. 11, 1948, p. 98-105.

Developments in cold forging during the past 10 years have completely outmoded and made obsolete equipment built prior to that time. Typical work being done on improved machines.

19b-146. Instrument Panels for New Hudsons Keep One Pressroom Section Busy. P. D. Aird. *Modern Industrial Press,* v. 10, Oct. 1948, p. 13, 16, 18, 24.

Equipment used.

19b-147. Step-by-Step Manufacture of the "Dan-Dee" Metal Basket. Walter Rudolph. *Modern Industrial Press,* v. 10, Oct. 1948, p. 40, 42, 44, 46.

Steps involved — mostly forming operations.

19b-148. The Effect of Shot-Peening Upon the Corrosion-Fatigue of a High-Carbon Steel. A. J. Gould and U. R. Evans. *Journal of the Iron and Steel Institute,* v. 160, Oct. 1948, p. 164-168.

Steel peened in seven different ways was subjected to corrosion-fatigue in very dilute H_2SO_4 and in sea water; fine-ground unpeened steel was also tested. It was found that peening greatly increased the endurance at common stress ranges. Addition of sodium carbonate and sodium bicarbonate to sodium chloride diminished the endurance of peened specimens; at high alkali contents, peened specimens have a shorter life than finely ground specimens.

19b-149. Metallurgical Control of Deep Drawn Stampings from Cold Rolled Steel. Part I. N. E. Rothenthaler. *Tool & Die Journal,* v. 14, Nov. 1948, p. 46-49.

The necessary steps in the design and construction of new dies for an automobile body. Surface and internal-quality factors in production of steel for the above. Use of "Cerrobend" alloy for making small experimental dies. (To be continued.)

19b-150. Cylinders Formed, Welded Automatically. *Machine Design,* v. 20, Nov. 1948, p. 154-155.

Machine for the above. The products are plain sheet-steel open-end cylinders.

19c—Nonferrous

19c-24. The Working Behavior of Phosphorus-Deoxidized Coppers Containing Bismuth. A. P. C. Hallowes. *Journal of the Institute of Metals,* v. 75, Sept. 1948, p. 1-18.

Nonarsenical coppers containing up to 0.1% Bi were rolled in the laboratory and arsenical and nonarsenical coppers containing up to 0.01% Bi were fabricated into tube and strips on a plant scale. Bismuth contents higher than those usually tolerable will not introduce fabricating difficulties if the temperature of hot working, or of annealing prior to cold work is substantially increased, and if intermediate annealing is followed by quenching. The heat treatment necessary to avoid embrittlement with deoxidized coppers of various bismuth contents.

19c-25. Designing Copper-Base Alloy Hot Die Pressings. F. S. Hyde. *Materials & Methods,* v. 28, Oct. 1948, p. 89-91.

19c-26. Composition and Properties of Nonferrous Alloys for Stampings, Including Deep-Drawn Parts. *Materials & Methods,* v. 28, Oct. 1948, p. 103, 105.

Data for eight brasses, three aluminums, three magnesiums, and zinc.

19c-27. Germany Extrudes Intricate Brass Shapes. *Product Engineering,* v. 19, Nov. 1948, p. 109. Based on PB 25664, "The Extruded Brass Rod Industry in Germany," Office of Technical Services. Dept. of Commerce, Washington. $1.75.

Production of hollow brass sections of intricate design on a 750-ton press.

19d—Light Metals

19d-54. Fabricating Curved Parts in Lighter Metals. Cyril J. Bath. *Modern Metals,* v. 4, Oct. 1948, p. 14-16.

Contour forming of light-metal extrusions, rolled shapes, or sheet. Typical civilian and military uses.

19d-55. Spun Glass Blankets for Press Stretching. *Aircraft Engineering,* v. 20, Oct. 1948, p. 315.

New technique developed to overcome difficulties in the hot forming of magnesium sheets.

19d-56. Work-Hardening Under Complex Stresses. K. H. Swainger. *Nature,* v. 162, Oct. 2, 1948, p. 532-533.

Plane stress yielding was induced in a duralumin plate by expanding a 12-segmented cylindrical collet. The tangential strains in the plate were measured at ten values of radius by means of single-filament Minalpha resistance-wire strain gages. At all loads, measured strains in the unyielded portion fitted the theoretical solution exactly.

19d-57. Leichtmetallschmieden auf der Waagerecht-Schmiedemaschine. (Forging Light Metal on the Horizontal "Forging Machine",) B. Preuss. *Metall,* Feb. 1948, p. 45-47.

Methods and equipment. Comparative cost analysis shows the economy of the new method.

19d-58. Redrawing Operations on Circular and Rectangular Shells. J. W. Lengbridge. *Tool Engineer,* v. 21, Nov. 1948, p. 27-30. (Installment No. 6 of a Series on the Theory and Practice of Pressing Aluminum.)

Details as obtained on redrawing 2S and 3S aluminum.

19d-59. New Applications Found for Aluminum Extrusions. F. W. Boynton. *Steel,* v. 123, Nov. 15, 1948, p. 92-94.

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Steel Sheet Passes Through 4 Ranges In Drawing Process

Reported by Knox A. Powell

Research Engineer, Minneapolis-Moline Power Implement Co.

The relationship of cold work and subsequent aging to the drawing qualities of sheet steel was clearly explained by Robert S. Burns, associate director of the research laboratories, Armco Steel Corp., before the October meeting of the Northwest Chapter A.S.M. The talk was illustrated with slides showing typical drawing defects; tables and charts to set forth the physical effects of cold work and subsequent aging; and slides showing carbon and sulphur segregation in rimmed ingots compared with aluminum-killed ingots.

The drawing process subjects the metal to three principal types of deformation, said Mr. Burns, namely, stretching, upsetting, and ironing or coining. Steel, in deforming, passes through (*a*) an elastic range, (*b*) a yield-point or "drop of the beam" range, (*c*) a strain hardening range where stress resistance increases faster than strain, and (*d*) a reduction of area range in which the reduction of section more than offsets the strain hardening.

Most drawing difficulties take place in the yield-point and the reduction-of-area ranges where deformation is inherently uncontrollable. The elastic limit can, of course, be moved over into the strain hardening range by a small amount of cold strain, but, unfortunately, cold worked sheet steel ages back in a matter of weeks toward the yield-point range. Sheet may be over-cold-worked to offset some of the aging, if it is not to be used immediately, but any cold work extending into the strain hardening range narrows the drawing range before the reduction-of-area effect comes into play.

Killed steel, said Mr. Burns, because of its freedom from irregularities due to carbon and sulphur segregation, is much easier to control in deep drawing than rimming steel. Roller leveling just before drawing frequently provides enough cold work to eliminate plastic deformation that may have been restored by aging.

Mr. Burns emphasized the necessity for close cooperation between the steel mill and the user in securing best drawing performance. Chemical composition and physical specifications are neither sufficient nor necessary.

Aluminum Association Meets

The 60th anniversary of the founding of the aluminum industry was celebrated in Pittsburgh on Oct. 14, during the autumn meeting of the Aluminum Association. A reenactment of the pouring of the first aluminum ingot featured the event. Among the speakers were Roy A. Hunt, president of Aluminum Co. of America, whose father was founder and first president of the Pittsburgh Reduction Co.; and Arthur V. Davis, chairman of the board for the Aluminum Co., one of the five original employees of the predecessor company. Zay Jeffries, vice-president of General Electric Co., was the principal speaker at the autumn banquet of the Aluminum Association.

Phenomena Revealed By Friction Study Depicted in Movie

Reported by W. G. Fassnacht

Assistant Chief Metallurgist
Bendix Products Division

"About 1880, some English engineers took down their handbooks, as engineers are wont to do, and figured that trains on the British railways had no right to run. In fact, frictional forces in the bearings were so great that no locomotive would be able to move a train. These same engineers then looked out the window and saw that the British trains were running. Being engineers, they came to the logical conclusion that the mathematics must be wrong."

From this observation stemmed the first scientific study of friction in bearings, according to Arthur F. Underwood, head, mechanical engineering, research laboratories division, General Motors Corp., speaking to the Notre Dame Chapter on Oct. 13 on "The Selection of Bearings and Their Lubrication." Some of the phenomena which this study discovered were depicted in a movie of a lucite bearing on an aluminum shaft.

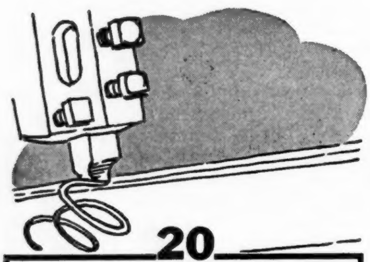
"What is a good bearing material?" Mr. Underwood says this is like asking to be shown a picture of America. Just as there are different kinds of scenes, all American, there are different materials, all bearings, suitable for different jobs.

The characteristics of bearing materials which influence selection prevent any material from being a perfect bearing. For instance, score resistant materials usually have low compressive strengths, and those that have high fatigue resistance usually are likely to fail because poor deformability causes eccentric loading. Corrosion resistance also helps determine which material is suitable. Thus it is that two bearing materials that work perfectly satisfactorily on the wrist pin and crankshaft of an engine would fail utterly if reversed.

Mr. Underwood's talk was supplemented by Kodachrome slides and furnished a very instructive and enjoyable evening.

Production techniques, the wide variety of shapes now available, and some of the new applications thus made possible.

For additional annotations indexed in other sections, see: 3b-173-181; 18d-14; 24a-235; 24b-96; 27a-140.



20 MACHINING and MACHINABILITY

20a—General

20a-403. Set-Ups for Grinding Milling Cutters. *Machinery* (London), v. 73, Oct. 14, 1948, p. 554-558.

Set-ups for sharpening different types of cutters on the Brown & Sharpe No. 5 tool-and-cutter grinding machine.

20a-404. What Makes A Cutting Fluid? Paul Graham. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 86-89, 108.

Cutting-fluid research and various equipment used.

20a-405. The Measurement of Periodic Errors in Gear-Hobbing Machines. C. Timms, A. A. King, and L. E. Jeans. *Engineering,* v. 166, Oct. 8, 1948, p. 337-340.

The original instruments for recording errors have been improved. The latest form of the instrument and its method of use.

20a-406. Practical Ideas. *American Machinist,* v. 92, Oct. 21, 1948, p. 126-130.

Micrometer adapter for accurate measurement of Sharp-V and American Standard screw threads (Charles Shope); setup for cutting threads with 18° taper (K. W. Thompson); rubber pads cushion gang-milling setup on arbor extension (G. R. Milner); pneumatic plunger in turret lathe replaces bar-feed mechanism (Donald E. Eaton); special drill grind for soft sheet metal (H. Scala); setup for threading shouldered studs (Harold W. Cutting); turning collars on the milling machine (L. Deresh); pivoting indicator tool checks vertical angles (Harry Smith); fixture for clamping four jaws simultaneously with one handle (F. W. Duce); set-screw chuck grips odd shapes (Tyler G. Hicks); V-tapered rollers center bars for punching (H. Moore); and other miscellaneous shop hints.

20a-407. Retractable Toolholder for Fine Boring. *Machinery* (London), v. 73, Oct. 7, 1948, p. 524.

20a-408. The Life of Carbide-Tipped Turning Tools. F. F. P. Bisacre and G. H. Bisacre. *Institution of Mechanical Engineers, Proceedings, War Emergency Issue* No. 35, 1947, p. 452-461; discussion, p. 461-469.

In the first part, an adiabatic theory of high-speed metal cutting, with no coolant, is analyzed theoretically. In the second part, a series of experiments made in 1933 on tool life is examined, and a rule is given that accurately correlates the results of these tests. In the final part, results of a study of those properties of the metal cut and of the tool that affect the life of the tool are given.

20a-409. The Priority of Russian Science With Respect to Knowledge Concerning the Mechanism of the Metal-Cutting Process. (In Russian.) S. I. Kashirin and F. A. Barbashov. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 1-6.

An addition to an article published in a previous issue covering the theoretical foundation of the Zvorikin-Briks theory of cutting, published in 1896, on which is based, seemingly, the "new theory" of M. Merchant (1944).

20a-410. Highly Efficient Method for Cutting Trapezoidal Threads. (In Russian.) E. N. Nikitin. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 26-27.

The method and the tools used.

20a-411. Sharpening Formed Milling Cutters With the "Oerlikon" Form and Cutter Grinding Machine, Model FS 21. Charles M. Calame. *Microtecnic* (English Edition), v. 2, Aug. 1948, p. 169-173. Adapted from the French.

20a-412. Grinding Radius-Lipped Tools. *Machinery* (London), v. 73, Oct. 21, 1948, p. 578.

The setup.

20a-413. The Accuracy of Automatic Lathes. D. J. Desmond. *Engineering,* v. 166, Oct. 22, 1948, p. 390-391. A condensation.

The usual quality-control procedure gives an estimate of the inherent variability associated with the manufacture of piece parts on a single-spindle automatic lathe. In many cases, such control charts run out of control, indicating the presence of additional variability depending upon time. A procedure has been designed to determine the magnitude of this effect and analyze it into its constituent parts.

20a-414. Straight Line Indexing. R. A. Schafer and R. Muhl. *Applied Hydraulics,* v. 1, Nov. 1948, p. 6-9.

Functioning of a multiple-operation machine in which a hydraulically operated and electrically controlled straight-line fixture automatically indexes, locates, and clamps a cylinder block progressively through 15 stations.

20a-415. Some Thermal Aspects of Metal Cutting. A. O. Schmidt and J. R. Roubik. *Tool Engineer,* v. 21, Nov. 1948, p. 20-23.

Results of research on the distribution of heat generated in drilling Dowmetal.

20a-416. Piloted Boring Bars. A. E. Rylander. *Tool Engineer,* v. 21, Nov. 1948, p. 36-37.

Design of bars and pilot bushings, single-point tools for precision, and broached-hole insets.

20a-417. Gadgets. *Tool Engineer,* v. 21, Nov. 1948, p. 38-39.

Piano Wire for Eyelet Machine Needles, Frank Martindell; Precision Combination Case, Robert Mawson; Work Ejector for Drill Press, Paul H. Winter; Milling on the Drill Press, R. Andrews; and Inserted-Tooth Milling Cutter, Carl Bjorklund.

20a-418. Multiple Wheel Grinding Speeds Up Crankshaft Production. Ora F. Mishler. *Machinery,* v. 55, Nov. 1948, p. 162-169.

Main bearings of six-cylinder automotive crankshafts are being finished three times faster than previously by the use of multiple-wheel grinding machines. Bearing diameters are maintained to a tolerance of 0.0005 in. without rough-grinding.

20a-419. The Use and Operation of Single and Multiple Spindle Automatics. Ralph A. Warren. *Machine and Tool Blue Book,* v. 44, Nov. 1948, p. 115-118, 120-122, 124.

A simple form and cut-off job, and one turret-tool operation.

20a-420. How Would You Recondition a 10 x 20 ft. Surface Plate? Rupert Le Grand. *American Machinist,* v. 92, Nov. 4, 1948, p. 92-93.

Methods and equipment used to produce a surface accurate within 0.0003 in. from a plate which was out of level by 0.140 in.

20a-421. Cost-Cutting Milling Setups. Allan F. Clark. *American Machinist,* v. 92, Nov. 4, 1948, p. 94-96.

Factors involved in planning most efficient setups, and how much time and money can thus be saved.

20a-422. Practical Ideas. *American Machinist,* v. 92, Nov. 4, 1948, p. 120-124.

Fixture which centers forged links for drilling (Clifford T. Bower); radius-cutting lathe tool mounted in toolpost (Allan B. Nixon); toolholder for heavy cuts (George W. Wilson); bore-checking gage (Jay M. Clark); indicator on caliper leg for closer reading of inside dimensions (W. A. Dice); block for clamping boring bar (Ray Cafiero); lathe mount for torch cutting rectangular shapes (Charles Homewood); finishing lead metallographic samples by means of razor blade mounted in lathe (G. R. Milner); and other miscellaneous shop hints.

20a-423. Kellering Speeds Part Duplication. Walter G. Patton. *Iron Age,* v. 162, Nov. 4, 1948, p. 102-105.

The Keller machine is basically a duplicating milling machine. For making limited numbers of parts, especially of intricate shape, and for production of experimental parts without expensive pattern or die costs, it is recommended from the standpoints of speed and cost. Typical jobs and setups.

20a-424. Economies of Interchangeability in Jigs and Fixtures. Phil Lindhuber. *Iron Age,* v. 162, Nov. 11, 1948, p. 110-113.

Advantages of universal jigs and fixtures, so designed that they can be easily and quickly changed over to suit a large number of similar parts for machining, and typical fixtures of this type.

20a-425. How to Sharpen Carbide-Tipped Hobs. *Steel,* v. 123, Nov. 15, 1948, p. 95-96, 137, 140, 142.

Equipment for the job, handling of carbides, selection of wheels, feeds and speeds, methods of truing, dressing, and inspecting.

20a-426. Permissible Limits and Measurement of the Roughness of Machined Surfaces. P. E. Dyachenko. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 385-387. Translated and condensed from *Stanki i Instruments* (Machine Tools and Instruments), no. 9, 1947, p. 17-20.

Experiments have shown that the measured surface roughness of machined metal is usually rather different from that which may be expected from calculations based on the shape of the tool used for machining. The measure of irregularity as a function of the cutting speed and the feed. The limits of the various ranges in which the roughness characteristics differ from each other. Calculated formulas for determining the measure of roughness.

20a-427. Tool Engineering Ideas. *Machinery,* v. 55, Nov. 1948, p. 219-222.

Fixture for Drilling Spindle Rails of Various Lengths, Harold E. Mur-

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Practical Problems of Machinability

The first Portion of Lecture III on "The Working of Steel" Written by Chester M. Inman for the Worcester Chapter A. S. M.

THE QUESTION of machinability is a complex and debatable subject. In an over-all picture of the machinability of any piece, many variables must be considered—the operating condition of the machine tool, the character and design of the workpiece, the character and design of the cutting tool, and the type of finish desired. However, in any definite operation for the removal of material there are two main requirements—satisfactory finish and satisfactory tool life. It is upon these two factors that most of the definitions for the machinability of steel are based.

In this discussion, we shall confine ourselves mainly to those variables in the internal mechanical structures obtainable in steel, and the external mechanical variations in the cutting angles of the tool, both of which combine to determine the actual machining characteristics of the metal for any definite operation. We shall show that, for maximum machinability, the best condition of the material (hardness and microstructure) will vary for each definite operation such as turning, drilling, tapping, broaching, as the speeds, feeds, and cutting rake of the tool are changed or limited by the particular operation. It should be emphasized that we are assuming that the important factors of the rigidity of the operating machine, of the tool set-up, and of the work are satisfactory.

Character of Chip

The secret of the machinability of steel for satisfactory finish and tool life lies in the mechanical character of the chip formed by the increasingly compressive action as the advance of the cutting tool overcomes various forces. These are (*a*) the elasticity of the steel, (*b*) the plastic deformation, which in soft material actually reaches to a considerable depth below the cutting edge of the tool, and (*c*) the compressive shear strength of the steel.

Chip formation is mainly dependent upon the following variables:

1. Composition, hardness, or brittleness of the workpiece as determined by the microstructure of the steel.
2. Design of the cutting tool—mainly the cutting angle or rake of the tool.
3. Cutting speeds and feeds.

As a cutting tool advances into the work, the material immediately ahead of the cutting edge is compressed. It is increasingly distorted, has a tendency to become trapped and to build up at the cutting edge as it tries to escape along the face of the tool. As the stress in the material further ahead of the tool increases, it finally causes actual rupture or plastic flow in a plane approximately at right angles to the face of the tool. With relatively brittle material, failure is by rupture or fracturing, and segments pass along the face of the tool. With relatively ductile material, failure is by plastic flow, and a more or less continuous ribbon passes along the face of the tool.

If the material is relatively brittle or of sufficient hardness, or the thickness of the chip is great enough to develop cold work hardness by plastic deformation, definite repeating ruptures take place over a small region of the chip. The chip will not be continuous, but a series of individual segments more or less closely joined together. In other words the material may be considered as being pushed off rather than cut apart. Under proper operating conditions for the formation of small segments, a good finish will be produced on the work. This type of chip is called a "segmental" or "discontinuous chip" and the favorable conditions for its formation are:

1. Relatively brittle material.
2. Small rake angle (for increased pushing action of the tool).
3. Large chip thickness (to increase cold workhardening action).
4. Low cutting speed (to increase friction between tool and chip).

If the material is relatively ductile (that is, if the plastic deformation range is relatively large), definite successive ruptures will not take place; instead, the material ahead of the tool will yield by plastic flow over a broad region. As this material is forced out of the path of the advancing tool, it separates from the initially compressed portion at the cutting edge, and a ribbon-like chip slides over the face of the tool. In other words, ductile material is being cut apart rather than pushed off. If the material is not too soft, thereby becoming trapped at the cutting edge of the tool, the type of chip produced is known as a "continuous chip with no built-up edge." The favorable conditions for its formation are:

1. Relatively ductile material.
2. Large rake angle (for increased cutting action of the tool).
3. Small chip thickness (to decrease pressure between tool and chip and so lessen the chances for the formation of a built-up edge).
4. High cutting speed (for reduction of friction between tool and chip).
5. Keen cutting edge (necessary for cutting action desired).
6. High polish on cutting edges and rubbing faces of the tool—obtained by superfinishing or hand honing (for reduction of friction and to eliminate the sawtooth condition of the cutting edge caused by grinding).
7. Tool material with low coefficient of friction (casehardened, chromium plated, nitrided steel; carbide tools).
8. Use of a suitable cutting compound at low speeds (for the reduction of friction).
9. Use of a coolant at high speeds (for low operating temperatures at the cutting edge of the tool. At times it is also necessary to use a coolant to hold work size).

With relatively ductile material, if the conditions for the formation of the "continuous chip with no built-up edge" are not satisfied (and espe-

(*Turn to page 43*)

The second portion of this lecture, to be published in a later issue, will deal with means of obtaining satisfactory tool life—another requirement for good machinability. The first two lectures in this series on "The Working of Steel" were published in the July and October issues of Metals Review.

phey; Increasing the Capacity of a Lathe Chuck, John Meyer; Gage for Determining End Diameters of Tapered Holes, H. Moore; Reciprocating Head for Auxiliary Operations on Milling Machines, D. E. McDonald and Fred Shrier; and Lever-Operated Adjustable-Stroke Heavy-Duty Cutter, Edward Diskavich.

20a-428. Theory and Practice of the Crush-Dressing Operation on Grinding Wheels. E. C. Helfrich. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 885-889; discussion, p. 889-891.

A qualitative analysis of the crush-dressing process based upon experimental evidence. The theory developed accounts for the forces involved, power requirements, rate of wheel removal, effect of wheel and crusher diameters, and surface speed on the crushing process. Advantages and disadvantages of crush-dressing vs. diamond-truing.

20a-429. Tooling the Automatic for Volume Production. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 22-26.

Complete details of setup for production of a multiple-use automotive product used in exceedingly large quantities.

20a-430. Pitfalls to Avoid in Tooling Screw Machines. Part Seven. Noel Brindle. *Screw Machine Engineering.* v. 10, Nov. 1948, p. 28-31.

Five additional styles of end turning tools which are widely used on the automatic screw machine. Each tool is assigned to a job to which it is best suited. Recommendations and limitations regarding the extent to which each tool can profitably be applied.

20a-431. Interchangeable Male Plug Gages. Pennell H. Embleton. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 33-34.

Method of manufacturing interchangeable plug gages showing how the screw-machine department may more easily acquire a wide range of gages, yet manufacture the plug gage blanks and handles.

20a-432. Table of Corrected Tool Diameters for Non Top-Rake Circular Tools: 3½" Diameter—¼" Offset. Ervin Hodson, Jr. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 36-39.

Includes explanation of use.

20a-433. Practical Ideas. *American Machinist.* v. 92, Nov. 18, 1948, p. 127-130.

Pantograph-leg linkage adapts special compass for blueprint work (Clifford T. Bower); reverse reamer transfers blind the holes to frame (Thomas Patell); scale tool locates bolt circle (Harold W. Cutting); goose-neck cutter planes curved surfaces (G. R. Milner); table of constants for use in making accurate form tools for V-belt pulleys (D. E. Sweet); bender for cold reduction of tubing (S. Framurz); use of European-type punch guides to simplify die making (Federico Strasser); and other miscellaneous shop hints.

20b—Ferrous

20b-82. Machining and Assembly Operations on Looms; Methods Employed at the Works of the British Northrop Loom Co., Ltd. *Machinery* (London), v. 73, Oct. 14, 1948, p. 547-553.

20b-83. The Production of Components for Automatic Looms. Operations on Milling Machines, Automatics, and Presses. *Machinery* (London), v. 73, Oct. 7, 1948, p. 519-524.

20b-84. Modern Milling Machines and Cutters for Production. A. O. Schmidt. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 90-93, 106-107.

Results of investigation over a 5-yr. period of high-speed milling and cutter design. Calorimetric-power and cutter-life tests were applied, using specially designed dynamometers.

20b-85. Progress in Turbine Gear Manufacture in Recent Years. A. Sykes. *Institution of Mechanical Engineers, Proceedings,* War Emergency Issue No. 35, 1947, p. 405-417; discussion, p. 432-451.

The hobbing machine still remains the accepted means of cutting high-speed gears, but there is considerable difference of opinion as to whether creep or noncreep machines are superior. Use of master index wheels having a fine pitch and greater accuracy in construction; the process of crossed axis shaving. Experiments with carbide-tipped hobs.

20b-86. Determination of Optimum Back Angle During Operation of Rapid Milling Machines. (In Russian.) M. N. Larin. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Aug. 1948, p. 7-11.

A general formula for calculation. This value is independent of rate of cutting, of quality and mechanical properties of the steel and of value of lead angle, within certain limits; and of the method of cutting.

20b-87. Surface Finish: The Influence of Suspended Swarf in Grinding Coolant. Arthur Scrivener. *Microtecnic* (English Edition), v. 2, Aug. 1948, p. 179-181.

Equipment for automatic and continuous removal from the coolant of the ferrous swarf and broken abrasive grit deposited therein by the action of the grinding wheel.

20b-88. Gear Shaving; High Production Rates on Distributor Shaft Drive Gears. *Automobile Engineer,* v. 38, Oct. 1948, p. 374.

Production in the U. S. at the rate of one finished gear every 15 sec. by means of semi-automatic "underpass" shaving machines.

20b-89. Fuel Injection Equipment; A Survey of the Production Methods Employed by C. A. V. Ltd. (Continued). *Automobile Engineer,* v. 38, Oct. 1948, p. 377-384.

Methods employed in the production of nozzle-body holders, nozzle bodies, and valves. The manner in which multi-spindle automatic machining is used for preliminary operations, and typical automatic machining sequences for each component. Methods employed to produce close dimensional accuracy and high quality surface finishes.

20b-90. Machining Cotton Spinning Spindles; Special Equipment for Centreless Grinding and Turning. *Machinery* (London), v. 73, Oct. 21, 1948, p. 575-578.

20b-91. Outstanding Operations in Producing Kaiser-Frazer Steering Assemblies. John J. Shepp. *Machinery,* v. 55, Nov. 1948, p. 202-207.

Some unusual machining, inspecting, and finishing operations in production of 900 steering assemblies per day.

20b-92. Step-Drilling Machine for Crankshafts. *Product Engineering,* v. 19, Nov. 1948, p. 98-100.

Automatic crankshaft-drilling machines for Ford and Mercury engines.

20b-93. How Tooling Problems Were Decided for Cadillac's New V-Eight Cylinder Block. Harold G. Warner. *Automotive Industries,* v. 99, Nov. 1, 1948, p. 38-39, 86, 88, 90.

Planning of tooling and machining methods.

20b-94. Tool Angles for Machining Meehanite Castings. *American Machinist,* v. 92, Nov. 4, 1948, p. 139.

Recommended tool shapes and angles, including cutting speeds for various grades.

20b-95. An Evaluation of Cylindrical-Grinding Performance. R. E. McKee, R. S. Moore, and O. W. Boston. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 893-900; discussion, p. 900-901.

Third in a series on cylindrical grinding. Results of an investigation of the grinding process with particular reference to the influence of certain variables, such as wheel grain, grade, and velocity; table-traverse feed; depth of cut; and type of material; for three steels and two cast irons.

20b-96. Step by Step in the Manufacture of Cylinder Sleeves. Joseph Geschelin. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 38-39, 96.

Turning out dry liners for diesels.

20b-97. "Tailoring" Buses with Precision Band Saws. H. J. Chamberland. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 40-41, 62, 64.

Various types of specialized band saws used to speed cutting of jigs, templets, body panels, and steel tubing for frames.

20b-98. Carbide Tooling Increases Screw Machine Production Six-Fold. *Screw Machine Engineering,* v. 10, Nov. 1948, p. 32.

Diagrams and test show how a 2-in. diam. part is made from S.A.E. 1020 carbon steel in 14.7 sec. on a 6-spindle automatic screw machine, a production increase of six times that of the previous setup using high speed tools.

20b-99. Motorized Wheelbarrows Roll Through Straight-Line Layout. Arthur Hess. *American Machinist,* v. 92, Nov. 18, 1948, p. 118-119.

Machining setups for production.

20c—Nonferrous

20c-11. Carbides Speed Copper Machining. C. R. Morgan. *American Machinist,* v. 92, Oct. 21, 1948, p. 102-103.

How changes in drill and threading-tool design cut cycle time and produce better finishes with reduced tool breakage.

20c-12. Carbide Die Maintenance. Richard Saxton. *Metallurgia,* v. 38, Oct. 1948, p. 314-316.

Maintenance of dies used for cold forming, drawing, and other purposes.

20c-13. Broaching Helical Oil Grooves. *Tool Engineer,* v. 21, Nov. 1948, p. 35.

An application of broaching, in which up to 30 internal 10° helical oil grooves, in connecting-rod piston-pin bushings for diesel engines, are broached at one pass.

20c-14. How to Machine Vitallium. Jesse Sdano. *American Machinist.* v. 92, Nov. 18, 1948, p. 96-98.

Usually considered non-machinable, Vitallium alloys can be successfully drilled and milled with carbide cutters. Test results.

For additional annotations indexed in other sections, see:

3b-161; 12b-71; 19b-142; 24a-214; 27a-144-146; 27b-42.

MACHINABILITY

cially so with very soft structures), a compressed portion of the steel will be trapped at the cutting edge to form a built-up wedge. The compressed material at the cutting edge adds to the wedge as fragments are torn off by the flowing chip or by the passing work. Those fragments tend to break the tool edge and to give an uneven cutting action because of the extra pressure they exert as the fragments are forced into the work. This results in a rough surface and workhardened spots where the fragments have become glazed.

The great majority of machining difficulties arise with ductile materials that form a built-up edge. Low-carbon steels which present a soft, gummy condition, along with other steels that have been heat treated for ductility, are prone to develop a built-up edge. Constant reports are made when machining such material at slow speeds that the steel is "too hard" or that there are "hard spots" in the steel. In the first complaint, fragments from the built-up edge cause early failure of the cutting edge, and, in the second, the fragments have become embedded in the work. Low-carbon and high-ductility steels from their very nature cannot be hard, but they are much more difficult to machine and drill than the higher carbon and harder steels and especially more difficult to tap and broach.

Finish on the cut surface is improved as the built-up edge is reduced in size. This reduction may be accomplished by one or more of the following expedients, all of which tend to increase the cutting action of the tool and to lessen the pushing action or compressive force.

1. Increasing the rake of the tool.
2. Increasing the speed.
3. Reducing the cut.
4. Putting a high polish on the cutting and rubbing faces of the tool.

Thus far we have used the broad terms, "relatively brittle" or "relatively ductile" material. In other words, we have been considering the overall machining qualities of the composite mechanical structure of which the steel is composed—that is, the combined effects of grain size, matrix, and carbide formation. For best results and for quantity production work, the composition and mechanical formation of the internal microstructure of the steel are of major importance in the mechanical formation of the chip. This demands close cooperation between the metallurgical, purchasing, heat treating, and machining departments.

Experience has shown that, with an understanding of the mechanics of chip formation thus far outlined, and an application of these principles to machining problems, generally passable results may be obtained on small lots of material, or a more intelligent description of what is desired may be given to the heat treating department.

Rake, Feed and Speed

A study of the requirements of good machining properties, ranging from relatively brittle material on one extreme to relatively ductile material on the other, shows definite trends which should be considered in any machining problem. These requirements are:

	For Brittle Material	For Ductile Material
Rake Angle	Small	Large
Chip Thickness....	Large	Small
Cutting Speed	Low	High

The following axioms should be noted:

The harder or more brittle the material, the smaller the rake angle and the slower the cutting speed.

The smaller the rake angle on a tool, the harder or more brittle the material should be.

Roughing cuts require heavy chips and slow speed.

The more ductile the material, the larger the rake angle and the higher the cutting speed.

The larger the rake angle on a tool, the softer the material may be.

Finishing cuts require light chips and high speed with polished rubbing faces.

In applying these axioms to the various cutting tools in use, consideration must be paid to the limitations imposed by design on the cutting rakes obtainable. and on the operating speeds and feeds.

With a lathe tool for turning, a large range of cutting angles, feeds and speeds may easily be produced, so the softest structure of steel may be used (approximately Brinell 160). On the other hand, this same soft structure may cause a built-up edge and rough surface at the slower speeds generally encountered in a planer or shaper. At the other extreme, in a broaching operation where less rake is used on the tool and the operating speed is much slower, a considerably harder or more brittle structure is required (about Brinell 210).

Drilling operations, where the cutting rake depends upon the spiral of the flutes and the angle of the point, generally require a somewhat harder structure than the best structure for turning. As a general rule, the hard-

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21a—General

21a-148. How Buick Builds the Dynaflow. Chester Ricker. *American Machinist,* v. 92, Oct. 21, 1948, p. 91-95.

A wide variety of equipment and procedures used.

21a-149. Creating a Kodak. H. E. Linsley. *American Machinist,* v. 92, Oct. 21, 1948, p. 98-100.

Use of standard and special equipment at Eastman Kodak to manufacture a precision product on a quantity production basis.

21a-150. Ford Handles by Automation. Rupert Le Grand. *American Machinist,* v. 92, Oct. 21, 1948, p. 107-122.

Applications of the "automation" technique to presses, welders, and other equipment. Automation is the art of applying mechanical devices to manipulate workpieces into and out of equipment, turn parts over between operations, remove scrap, and to perform these tasks in timed sequence with the production equipment so that the line can be put wholly or partially under pushbutton control at strategic stations.

21a-151. Precise Processing Produces Flatirons Faster. Leo J. Pantas. *American Machinist,* v. 92, Nov. 4, 1948, p. 98-100.

How die-cast aluminum shoes with cast-in heating elements and ingenious tooling combine to speed production of domestic flatirons.

21a-152. Streamlined Production: Burroughs Adding Machine Company. *Production Engineering & Management,* v. 22, Nov. 1948, p. 59-66.

Equipment and procedures used in production of business machines.

21b—Ferrous

21b-78. Coil Springs—From a Western Plant for Western Use. *Western Metals,* v. 6, Oct. 1948, p. 32-33.

21b-79. Ford's New Methods of Forming and Machining Axle Housings. Charles H. Wick. *Machinery,* v. 55, Nov. 1948, p. 152-161.

An unusual, high-production setup for manufacturing light-weight rear-axle housings from welded steel tubing. The work passes automatically through tube-reducing, welding, and machining operations on a completely mechanized production line.

21b-80. Handling Hot Steel Bars. L. E. Trishman. *Welding Engineer,* v. 33, Nov. 1948, p. 62.

Welded rig for handling long bars of alloy steel after heat treatment at high temperatures.

21b-81. Seattle "Aircraft Repair" Produces Seats for Independent Airlines. *Modern Industrial Press,* v. 10, Oct. 1948, p. 48, 50.

Welding, bending, machining, and other operations.

21b-82. Revolutionary Automation at Ford Operates with Iron Hand. Joseph Geschelin. *Automotive Industries,* v. 99, Nov. 15, 1948, p. 24-27, 70, 72.

System by means of which parts are automatically transferred successively from one machine to another in a straight line setup for mass production.

21c—Nonferrous

21c-10. Manufacturing Carbide Drills. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 78-81.

21d—Light Metals

21d-14. Northwest's Aluminum Trucks. A. M. Ingebretson. *Western Machinery and Steel World,* v. 39, Oct. 1948, p. 74-77, 102.

Manufacture of aluminum truck bodies.

For additional annotations indexed in other sections, see: 24b-107; 27a-147-150.

22a—General

22a-229. The Function of the Coating of Welding Rods. J. D. Fast. *Philips Technical Review,* v. 10, Oct. 1948, p. 114-122.

Requirements that have to be met by welding-rod coatings. Protection afforded by the slag against oxygen and nitrogen. The most important types manufactured by Philips.

22a-230. Resistance Welding in Mass Production; Recommended Machine Settings. A. J. Hipperson and T. Watson. *Welding,* v. 16, Oct. 1948, p. 436-445.

Means of measuring electrical variables, recommended settings for spot seam, projection, and flash welding of mild steel, stainless steel, and aluminum.

22a-231. Sampling of Welds by Trepanning and Allied Methods. R. B. Lincoln. *Welding Journal,* v. 27, Oct. 1948, p. 809-811.

Recommended procedures.

22a-232. An Investigation of Methods for Evaluating Welding-Arc Stability and Their Application. Robert A. Wyant, Lauriston P. Winsor, and L. McDonald Schetky. *Welding Journal,* v. 27, Oct. 1948, p. 502s-514s.

Development of instrumentation for quantitatively evaluating above stability and application of such instrumentation to study of some actual welding arcs. Instrumentation has taken the form of circuits for determining r.m.s. values of the fluctuating components of arc current and voltage and for counting short circuits.

22a-233. New Welding Electrode Specifications. Thomas E. Lloyd. *Iron Age,* v. 162, Oct. 28, 1948, p. 70-73, 131.

New sets of A.W.S.-A.S.T.M. specifications for copper and Cu alloys and for high-tensile low-alloy steel arc welding electrodes, and revisions of specifications for corrosion-resisting and for mild-steel arc welding electrodes.

22a-234. Contribution aux progres de la construction soudée dans l'industrie aéronautique. (New Developments in Welded Construction in the Aircraft Industry.) A. Nepoti. *Soudure et Techniques connexes,* v. 2, July-Aug. 1948, p. 140-152.

A series of examples from the European aircraft industry. Compares riveted duralumin structures and welded steel structures and recommends the latter.

22a-235. New Electronic R-W Controls. Part Three. Control Features and Sequence Timers for Synchronous Precision Timing. (Concluded.) B. Sussman. *Welding Engineer,* v. 33, Nov. 1948, p. 56-58.

Circuit diagrams.

22a-236. How to Choose and Use the Correct Electrode. Part III. Lew Gilbert. *Industry and Welding,* v. 21, Nov. 1948, p. 36-38, 40, 42.

Concluding installment contains information on electrode classification and identification. Stainless-steel procedures, preheating, and stress relieving.

22a-237. Safety Is so Simple. J. I. Banash. *Industry and Welding,* v. 21, Nov. 1948, p. 44-46, 48, 51-52.

Safety precautions for oxy-acetylene welding and cutting.

22a-238. Here Are Some Helpful Hints On Resistance Welder Maintenance. F. R. Woodward. *Industry and Welding,* v. 21, Nov. 1948, p. 64, 66-69.

22a-239. How to Care for Transformer Type A.C. Arc Welders. J. R. Morrill. *Factory Management and Maintenance,* v. 106, Nov. 1948, p 120-123.

Maintenance procedures. Causes and remedies for troubles.

22a-240. How to Use Helium-Shielded Arc Welding. Harold O. Jones. *American Machinist,* v. 92, Nov. 4, 1948, p. 101-116.

Special section on the subject.

22a-241. Design Characteristics of Contact Welding Machines. (In Russian.) A. Z. Blitshtein. *Avtogennoe Delo* (Welding), Aug. 1948, p. 1-6.

A graphic method for determination of design characteristics. Experimental investigation confirms the applicability of this method to the determiniation of welding-machine characteristics prior to their operation. Use of the diagram.

22b—Ferrous

22b-313. The New Nylon Factory; Use of Heavy Columns of Welded Steel. Guthlac Wilson and W. A. Mitchell. *Welding,* v. 16, Oct. 1948, p. 415-418, 446.

Steelwork of new British factory.

22b-314. Some Modern Developments in Steels for Welded Structures. W. Barr. *Welding,* v. 16, Oct. 1948, p. 419-427.

Development of alloy steels and their weldability. Weld hardening and the mechanism of brittle fracture. Weld sections on which hardness gradients are indicated.

22b-315. Trend of Boiler Welding Repairs; Advances in Technique. J. K. Johannesen. *Welding,* v. 16, Oct. 1948, p. 433-435.

22b-316. General Welding Practices in Locomotive and Car Shops. J. Michne. *Welding Journal,* v. 27, Oct. 1948, p. 781-784.

Practical recommendations.

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MACHINABILITY

er the material the blunter the drill point should be.

The cutting action of reamers depends upon whether straight or spiral flutes are used.

Taps and chasers should be ground with a suitable rake or hook for the microstructure of the work.

These few illustrations show that, for best machining conditions, either the rake angle or the tool must be varied with the nature of the material, or the material must be conditioned by heat treatment to the most satisfactory carbide structure for the rake of the tool, as well as operating conditions of speed and feed.

Recommended Heat Treatments

To produce, by heat treatment, a microstructure most suitable for a particular machining operation, a uniform condition must be produced throughout the entire lot of steel. In other words, the degree of uniformity of one piece to another is of great importance while the actual microstructure may vary within certain limits. Roughly speaking, the following conditions give material that can be machined satisfactorily:

Low-carbon and alloy steels up to 0.30 % carbon—as rolled or normalized with coarse grains.

Medium-carbon—for turning, normalized or annealed for pearlite structure; for other operations, normalized, or (depending upon carbide content) annealed with not over 25% spheroidized.

High-carbon steels—spheroidize annealed, except for broaching, when quenched and tempered structures are generally preferred.

With a well-ground high speed steel tool the harder and less ductile steels do not give much trouble as regards surface finish. Nor is much trouble encountered from wear or tool breakage until the hardness exceeds Brinell 360 (Rockwell C-38) for steady cuts and about Brinell 320 for intermittent cuts.

Machining the austenitic stainless steels presents a somewhat different problem. These steels, with a hardness of approximately Brinell 160, have an inherent high ductility, but at the same time they cold work harden and glaze very readily unless continuous cuts of sufficient depth are taken. They tend to produce a tough, continuous chip during machining which is difficult to dispose of. For this reason, chip breakers are generally employed whenever possible. Slower speeds and increased feeds also help.

B. C. Chapter Hears History of Al in Canada

Reported by Paul H. Hookings

Metallurgical Engineer
Major Aluminum Products Ltd.

A successful joint dinner meeting was held on Oct. 20 in Vancouver by the British Columbia Chapter A.S.M. and the Vancouver Branch of the Canadian Institute of Mining and Metallurgy.

The coffee speaker at the banquet, which was attended by 120 members, was N. F. Dick Pullen, public relations manager of the B. C. Telephone Co., Ltd. Mr. Pullen was highly amusing with his "technical talk" entitled "Strange Interlude".

Feature speaker was I. S. Decarie, director of information for the Aluminum Co. of Canada. His subject "The Aluminum Trail" covered the origin and development of the aluminum industry in North America from the discovery of modern methods of production to the surveys for plant sites which are being carried on in British Columbia at the present time.

Mr. Decarie also showed an extremely interesting motion picture "Power From Ship Shaw", together with a large group of colored slides depicting the various points of operation of the company.

22b-317. Arc-Welded Steel Framing Reduces Cost of Residential Building. A. F. Davis. *Welding Journal,* v. 27, Oct. 1948, p. 788.

22b-318. Submerged Arc Welding of Freight Cars. E. A. Watson. *Welding Journal,* v. 27, Oct. 1948, p. 789-793.

22b-319. What a Maintenance Department Can Do With Cutting and Welding in a Paper Mill. Jamison Moore. *Welding Journal,* v. 27, Oct. 1948, p. 793-795.

22b-320. Stud Welding Saves Time. *Welding Journal,* v. 27, Oct. 1948, p. 811.

Use to hold wire mesh reinforcing.

22b-321. Welded Bridges. LaMotte Grover. *Welding Journal,* v. 27, Oct. 1948, p. 812-826.

Welded bridges constructed in the U. S., Canada, and various foreign countries during the last 12 years; various practices in specifying steel materials; details of design; and methods of construction; results of some German fatigue tests of welded beams, and of some fatigue fractures in girders and stringers of riveted railway bridges; and repairs made by welding. 17 ref.

22b-322. Welded Stamped Grid Resisters. W. J. Kutcher and A. L. Ward. *Welding Journal,* v. 27, Oct. 1948, p. 827-830.

Design of a new resister made from a high-resistance alloy and the method of welding used in its construction. The alloy contains 12 to 14% Cr, 4 to 5% Al, 0.12% C, and balance Fe.

22b-323. Tapered Bore of Two-ton Rebuilt by Union-Melt Process. *Welding Journal,* v. 27, Oct. 1948, p. 856.

Bore of a forging-hammer ram.

22b-324. Effect of Weld Metal Composition on the Strength and Ductility of 15% Cr, 35% Ni Welds. David Rozel, Hallock C. Campbell, and R. David Thomas, Jr. *Welding Journal,* v. 27, Oct. 1948, p. 481s-491s.

Optimum composition limits for C, Si, Mn, S, and P were established, based on room temperature all-weld-metal tensile tests. The introduction of columbium into the weld metal improves soundness, but since it also decreases ductility, it is considered an undesirable addition.

22b-325. Furnace Brazing with Pressed Metal Parts. Part II. H. M. Webber. *Steel Processing,* v. 34, Oct. 1948, p. 554-556.

Miscellaneous applications. Copper-brazed bond between two steel parts shows interlocking structure which explains high strength of such parts.

22b-326. Comparison of Cements for Bonding Nitrile Rubber to Steel. Ross E. Morris, Joseph W. Hollister, and Paul A. Mallard. *Rubber Age,* v. 64, Oct. 1948, p. 53-56, 96.

Quantitative comparative data on chlorinated rubber vs. phenolic resin.

22b-327. Carbon Blocks Simplify Welding Jobs. Phil Glanzer. *American Machinist,* v. 92, Oct. 21, 1948, p. 124-125.

How machining time on welded repairs can be substantially reduced by using carbon plates, blocks, and rods to fix the shape of the weld.

22b-328. Welding Conserves Steel. T. R. Mullen. *Engineering News-Record,* v. 141, Oct. 28, 1948, p. 104-105.

Examples show such conservation in the building of large structures.

22b-329. Welding Stainless Containers by Inert-Gas Shielded Arc Process. *Steel,* v. 123, Nov. 1, 1948, p. 82-83.

Methods and equipment.

22b-330. A Portable Rig for Oil Wells. Henry W. Young. *Welding Engineer,* v. 33, Nov. 1948, p. 33-35.

Welded fabrication.

22b-331. RECO Makes Tanks. Gerald Eldridge Stedman. *Welding Engineer,* v. 33, Nov. 1948, p. 36-39.

Fabrication of a variety of pressure vessels.

22b-332. Truck Cabs Welded on the Assembly Line. Fred M. Burt. *Welding Engineer,* v. 33, Nov. 1948, p. 40-43.

Use of arc, gas, and spot welding for assembly of truck and passenger-car bodies.

22b-333. Mechanized Tube Brazing. Phil Glanzer. *Welding Engineer,* v. 33, Nov. 1948, p. 44-45.

Novel setup for oxy-acetylene brazing which speeds production of tubular rings for bar-stool footrests. The brazing ring is held in place by a steel "aligner".

22b-334. Screens, Doors and Hoops. Walter Rudolph. *Welding Engineer,* v. 33, Nov. 1948, p. 52-53.

Use of various resistance welding processes to make such diversified products as frames for doors and windows and steel barrel hoops.

22b-335. Welded Scows for Alaska. Margaret Ralston. *Welding Engineer,* v. 33, Nov. 1948, p. 54-55.

Novel fabrication method. The boats are built in quarters and later assembled on the water front.

22b-336. Automatic Welding on the Beam. W. S. Stewart. *Industry and Welding,* v. 21, Nov. 1948, p. 81-84.

Production of steel beams from flat plates by welding. This is done on a custom basis, for those who are unable to secure the desired shapes from the rolling mills.

22b-337. Welding Hudson's "Monobilt" Body-and-Frame. Charles H. Wick. *Machinery,* v. 55, Nov. 1948, p. 170-177.

Use of automatic, multiple-transformer resistance-welding machines and portable welders suspended above unique "Merry-Go-Round" conveyers in making approximately 5300 spot welds per car.

22b-338. Resin Bonding of Silicon Steels in Electrical Laminated Cores. S. B. Ashkinazy and J. J. Preisler. *Product Engineering,* v. 19, Nov. 1948, p. 85-89.

Problems encountered in the development of a satisfactory method for bonding silicon-steel laminations with a thermoplastic-resin adhesive. Electrical considerations underlying magnetic-core design. Effects of different annealing treatments on surface condition and magnetic properties of silicon steels.

22b-339. Welded Pipelines. Rolt Hammond. *Petroleum,* v. 11, Nov. 1948, p. 245-249.

Construction techniques used by Anglo-Iranian Oil Co. and other companies throughout the world.

22b-340. Flash Welding Speeds Output of Endless Steel Bands. *Steel,* v. 123, Nov. 15, 1948, p. 131.

22b-341. Static Strength of Spot-Welded Joints. (In Russian.) A. S. Gel'man and I. A. Bakh. *Avtogennoe Delo* (Welding), Aug. 1948, p. 6-11.

The influence of different factors, such as thickness of joined plates, distribution of spot-welds, welding conditions for a low-carbon steel.

22b-342. Method of Investigation of Technological Properties of Electrodes. (In Russian.) A. A. Erokhim. *Avtogennoe Delo* (Welding), Aug. 1948, p. 12-16.

Most important factors in arc welding are the ionization ability of electrodes, the process of electrode fusion, and formation of the welded seam. Methods for investigation. Theoretical bases and practical application of these methods. Deals only with welding of steel.

22b-343. "Mark MEZ-01" Electrodes. (In Russian.) N. N. Kryukovskii. *Avtogennoe Delo* (Welding), Aug. 1948, p. 16-17.

Properties of welds in steel made with above electrode. Composition of the electrodes and their coatings.

22b-344. Welded Structures. Steel Buildings, Trusses, Joists, Bridges, Floor Spans, Tanks. R. G. Alison. *Canadian Metals and Metallurgical Industries,* v. 11, Oct. 1948, p. 33, 38, 45.

Design factors and advantages of welding.

22b-345. Hardfacing Techniques; Comparison of Modern Methods. M. Riddihough. *Welding,* v. 16, Oct. 1948, p. 428-432.

Based on information forming part of a section of a book entitled "Hardfacing by Welding", to be published shortly. (To be concluded).

22b-346. Re-Engineered Welding Techniques Increase Man-Hour Output of Parts. E. A. Bussard. *Production Engineering & Management,* v. 22, Nov. 1948, p. 56-58.

How it was accomplished in the fabrication of miscellaneous parts for furnaces, heaters and stoves.

22b-347. Production Processes—Their Influence on Design. Part XXXVIII. Spot Welding. Roger W. Bolz. *Machine Design,* v. 20, Nov. 1948, p. 127-135.

Various types of welding and welding equipment, their applicabilities, and principles of design for most efficient use of welding.

22c—Nonferrous

22c-25. Miniature Resistance Welding and Its Application in the Radio Tube Industry. George Freedman. *Welding Journal,* v. 27, Oct. 1948, p. 838-844.

Optimum welding conditions for strip, wire, and tungsten-filament material. Results of a shear-tension study of the welding of 0.005-in. thick nickel strip under varying conditions. The phenomenon of the recrystallization nugget was studied metallographically.

22c-26. Welding a Bronze Bell. Marcus Maynard. *Welding Journal,* v. 27, Oct. 1948, p. 854.

Procedure used in repairing a 6-in. crack in a 1400-lb. bell.

22c-27. Copper Parts Production Welded. H. A. Huff, Jr. *Welding Engineer,* v. 33, Nov. 1948, p. 46-47.

Use of helium-shielded arc welding in mechanized production of rotors for induction motors.

22c-28. Copper-Alloy Arc-Welding Electrodes. *American Machinist.* v. 92, Nov. 18, 1948, p. 141.

Data are confined to chemical specifications, physical properties, and notes on the use of the five groups of electrodes.

22d—Light Metals

22d-59. Arc Welding of Aluminium and its Alloys. (Continued). A. Schärer. *Light Metals,* v. 11, Sept. 1948, p. 512-523. Translated from Doctorate thesis based on work in the Research Laboratories of the Aluminium Industrie, A. G. Neuhausen, Switzerland, under A. von Zeerleder.

Details of results of work on mechanical properties of welds made with Al-Si electrodes; welding of Al sheets of various thicknesses; fillet and lap welds; welding of pressure vessels; structure of the welded seam; and corrosion resistance of the weld deposit.

22d-60. Fatigue of Gusseted Joints. Howard H. Langdon and Bernard Fried. *National Advisory Committee for Aeronautics, Technical Note* No. 1514, Sept. 1948, 40 pages.

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California Ore Deposits Ample for Steelmaking Says Kaiser Official

Reported by W. P. Wallace
University of California

"Making Steel in California With Western Raw Materials" was the subject of a paper delivered by George B. McMeans, assistant general superintendent of Kaiser Co., Inc., Iron and Steel Division, Fontana, Calif., at the Sept. 23rd meeting of the Los Angeles Chapter, A.S.M. Mr. McMeans traced the early history of steel and iron on the Pacific Coast—from the very modest beginnings by the Mormons in 1852 at Cedar City, Utah, to today's growing industry of nearly two million tons of steel per year.

Before World War II, according to the speaker, there was a false rumor to the effect that California did not have iron ore. For the past five years, Kaiser Co. has been producing iron and steel from California iron ore deposits. The Eagle Mountain deposit alone has 24 million tons of ore (analyzing approximately 54% iron) with an additional 25 million tons of reserves. This is the largest deposit, although there are many others, some of bessemer grade.

The requirements for limestone can be filled by local California deposits. However, California does not have coking coal. Pacific Northwest coal can be made available for the local blast furnace, provided harbor facilities are built for handling coal shipped to California by water.

Mr. McMeans stated that the purchasing power is here, and by 1955 the Pacific Coast states will have nearly 12% of the national population. He indicated that by that time the West Coast will use approximately five million tons of steel per year. This will mean an increased expansion of the steel industry on the Pacific Coast.

W. R. Patterson, National Supply Co., presided as technical chairman for this meeting.

Technical Periodicals Indexed

A Union List of Scientific and Technical Periodicals in the libraries of greater Cincinnati, recently published, contains 3200 titles and more than 10,000 separate entries. It is brought out under the sponsorship of the Cincinnati Section of the American Chemical Society and will be sold at cost ($2.50 postpaid). Inquiries should be addressed to R. E. Oesper, department of chemistry, University of Cincinnati, Cincinnati 21, Ohio.

IMPORTANT MEETINGS

for January

Jan. 4—Society for Applied Spectroscopy. Symposium on Spectroscopy, Lecture Hall, Old World Bldg. (Socony-Vacuum Training Center), 63 Park Row, New York City; 8:00 p.m. (Henry H. Hausner, chairman, Public Relations Committee, S.A.S., Nichols Bldg. Room 108, University Heights, New York 53.)

Jan. 10-14—Society of Automotive Engineers. Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit. (John A. C. Warner, secretary, S.A.E., 29 West 39th St., New York 18.)

Jan. 10-14—Materials Handling Institute and American Society of Mechanical Engineers. Third National Materials Handling Show, Convention Hall, Philadelphia. (Clapp and Poliak, Inc., 350 Fifth Ave., New York 1.)

Jan. 14—Malleable Founders' Society. Semi-Annual Meeting, Cleveland. (M.F.S., 1800 Union Commerce Bldg., Cleveland 14.)

Jan. 24-28—American Society of Heating & Ventilating Engineers. Annual Meeting, Chicago. (A.S.H.V.E., 51 Madison Ave., New York City.)

Tests run on gusseted joints to determine the effect of gusset edge finish on fatigue life and to compare riveted 24 S-T joints with spot welded 24 S-T joints.

22d-61. A Case History of Flash Welding Aluminum. *Modern Metals,* v. 4, Sept. 1948, p. 30-31.

Methods and equipment for flash welding 61 S bar stock to 61 S tubing as developed for a job having rigid specifications.

22d-62. Magnesium Lift Floats Brazed Successfully. *Modern Metals,* v. 4, Sept. 1948, p. 29.

Brazing process used in manufacture of hydraulic-lift floats.

22d-63. The Work of the Welding Research Team at the University of Birmingham, July 1944 to January 1947. *Aluminium Development Association* (London), *Research Report* No. 1, Dec. 1947, 35 pages.

Analysis of research undertaken by the team.

22d-64. Contact Welding of Aluminum Alloys in the Automotive Industry. (In Russian.) F. E. Tret'yakov and B. D. Orlov. *Avtogennoe Delo* (Welding), July 1948, p. 22-23.

Methods and equipment.

22d-65. Welded Assembly of Aluminum Die Castings. *Die Castings,* v. 6, Oct. 1948, p. 28, 65-66.

Use of low-temperature oxygen acetylene welding to assemble two aluminum die castings into a "one-piece" housing for a fluid coupling used on automatic washing machines.

22d-66. Weatherwise Welded Awning. Henry Charles Suter. *Welding Engineer,* v. 33, Oct. 1948, p. 68.

When it rains, new awning will lower itself automatically. Its framework is made of aluminum aircraft tubing.

22d-67. The Effect of Wave Shape in Inert-Arc Welding Circuits. R. W. Tuthill. *Welding Journal,* v. 27, Oct. 1948, p. 785-788.

Analysis of an a.c. inert arc when welding aluminum showing an inherent arc characteristic which results in a flow of direct current. How this direct current may be generated and maintained, together with some of the factors which govern its size and effect. Effects on arc stability, penetration, power in the arc, contour of the weld, and primary power supply. Methods of removing this direct current.

22d-68. Field-Erected Storage Tanks of Aluminum. Fred L. Plummer. *Welding Journal,* v. 27, Oct. 1948, p. 796-804.

As used in various industries. Use of combined aluminum and steel tanks is said to have many advantages for storage of corrosive crudes. Design and welding procedures.

22d-69. Brazing Aluminum. G. W. Birdsall. *Welding Journal,* v. 27, Oct. 1948, p. 855-856. Reprinted from "Welding Aluminum", Reynolds Metals Co., Louisville, Ky.

22d-70. Preliminary Test of Spot-Weld Shunting in 24 S-T Alclad. A. R. Hard. *Welding Journal,* v. 27, Oct. 1948, p. 491s-495s.

An attempt was made to isolate the strength loss due to shunting in single-row spot welded joints. Tests of welds made at various spacings show a decline in strength per weld at closer spacings. Most of this decline was found to be caused by factors other than weld shunting. The effect of wire buffing and chemical treatment in preweld cleaning. A method of measuring shunt-path resistance through a spot weld was developed.

22d-71. The Effect of D.C. Component in A.C. Inert-Gas Arc Welding of Aluminum. G. J. Givson and G. R. Rothschild. *Welding Journal,* v. 27, Oct. 1948, p. 496s-501s.

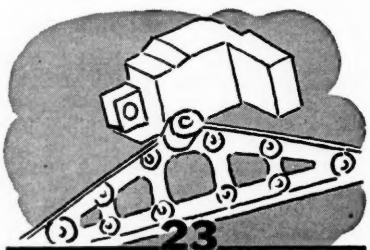
The nature of the d.c. component is shown by oscillograms of welding current and voltage. The question of measuring the effective values of welding current and meters used in the welding tests. Methods of controlling the d.c. component and tests on aluminum plates.

22d-72. Application of Methane for Welding Thick-Walled Aluminum Containers. (In Russian.) V. V. Danilevskii. *Avtogennoe Delo* (Welding), Aug. 1948, p. 27.

Proposed substitution of natural gas containing 94.8% CH_4 for acetylene. Method of welding and optimum conditions.

For additional annotations indexed in other sections, see:

15b-55-57-58; 19b-130; 24b-105.



APPLICATIONS

23a—General

23a-46. Precision Investment Castings Reduce Assembly Operations. Edwin Laird Cady. *Materials & Methods,* v. 28, Oct. 1948, p. 78-80.

Seven examples that show how precision investment castings reduce costs, speed production, and improve product design.

23a-47. Product Improvement Through the Use of Porcelain Enamel. Horace R. Whittier. *Finish,* v. 5, Nov. 1948, p. 29-30, 70, 72.

Uses of porcelain enamel in items such as telephone dials, street signs, and similar applications.

23a-48. Moulds—for Pre-Cast Concrete. *Light Metals,* v. 11, Oct. 1948, p. 549-563.

Varied applications of different metals and alloys for this purpose. Advantages of Al and Mg.

23b—Ferrous

23b-45. Mrs. Moo Gets a Break. *Steel Horizons,* v. 10, No. 4, [1948], p. 10-11.

Uses of stainless steel for dairy-products transportation, containers, and processing.

23b-46. Tobacco Handling Gets a Stainless Streamlining. *Steel Horizons,* v. 10, No. 4, [1948], p. 16-17.

Uses of stainless steel in tobacco processing.

23b-47 "Forever" Signs. *Steel Horizons,* v. 10, No. 4, [1948], p. 21-22.

Manufacture and applications of stainless-steel signs.

23b-48. Gas Turbine Kilowatts Are on the Way. *Steel Horizons,* v. 10, No. 4, [1948], p. 24-25.

Use of stainless and "super" alloys in G. E.'s new gas turbine for power plants.

23b-49. Nitrided-Steel Piston Rings for Engines of High Specific Power. John H. Collins, Jr., Edmond E. Bisson, and Ralph F. Schmiedlin. *National Advisory Committee for Aeronautics, Report* No. 817, 1945, 20 pages.

Several designs of nitrided steel piston rings were performance-tested under variable conditions of output. The necessity of good surface finish and conformity of the ring to the bore was indicated in the preliminary tests. The thin, nitrided steel rings were performance-tested in both nitrided and porous chromium-plated cylinders with good results.

23b-50. Cuves pour la fusion du zinc. (Crucibles for Melting of Zinc.) Gabriel Joly. *Fonderie,* July 1948, p. 1244.

Recommended compositions of metal for these crucibles.

23b-51. Selecting Materials to Reduce Maintenance. W. H. Sparr. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 134-138.

Recommendations for selection of alloys for specific uses.

23b-52. Magnetic Sheet Steel. D. Edmundson. *Engineer,* v. 186, Sept. 10, 1948, p. 269-271.

Requirements with regard to structure and properties for electrical steels. Analysis of the problem indicates that the advantages of anisotropic strip over randomly orientated material for transformer sheets are not so large as usually believed. Requirements for rotating electrical machinery, and the need for an improved magnetic permeability tester for strip.

23b-53. These Bombs Resist Destruction. *Inco Magazine,* v. 22, Fall 1948, p. 16-17.

Austenitic Cr-Ni-steel bombs used for chemical reactions in petroleum-industry research.

23b-54. Operation Without Lubricants. *Machine Design,* v. 20, Oct. 1948, p. 94.

Collins helium cryostat, an "engine" for cooling helium from −420 to −438° F. All known lubricants are solid in this range, so the piston must be operated absolutely dry. Nitrided Nitralloy, finished to close tolerances and high surface finish, is used for both piston and cylinder. Long slender stainless-steel supports are used to prevent excessive heat transfer from engine mount to piston and cylinder.

23b-55. Alloy Steel in Oil-Field Equipment. R. L. Adams. *Metal Progress,* v. 54, Oct. 1948, p. 468-470.

Types used for different pieces of equipment, including history of developments.

23b-56. Alloy Steel in Oil Refineries. F. C. Braun. *Metal Progress,* v. 54, Oct. 1948, p. 471-473.

Development of suitable types for various parts and equipment.

23b-57. Alloy Steel in the Turret Lathe. Donald M. Gurney. *Metal Progress,* v. 54, Oct. 1948, p. 474-476.

Development of suitable steels for various parts.

23b-58. Low-Alloy Steels in the Electrical Industry. J. T. Rettaliata. *Metal Progress,* v. 54, Oct. 1948, p. 477-481.

Steels and their specific applications.

23b-59. Structural Alloy Steels in the Air Age. Aircraft Engines. Arthur W. F. Green. **Alloy Steels in the Airplane Itself.** L. D. Bonham. *Metal Progress,* v. 54, Oct. 1948, p. 491-496.

Development of alloy steels for aircraft engines and structures.

23b-60. Role of Alloy Steels in the Automotive Industry. William F. Sherman. *Metal Progress,* v. 54, Oct. 1948, p. 497-501.

Development of alloy steels for various automotive parts.

23b-61. Alloy Steels in Railroad Service. J. L. Carver. *Metal Progress,* v. 54, Oct. 1948, p. 502-506.

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CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Jan. 12	University Club	Bruce W. Gonser	Unusual Metals—Their Growing Importance
Baltimore	Jan. 17	Engineers' Club	Bruce W. Gonser	Recent Advances in Nonferrous Metallurgy
Boston	Jan. 7	Hotel Sheraton	Howard C. Cross	Titanium
Calumet	Jan. 11	Phil Smidt & Son, Whiting, Ind.	H. S. Brown	Atomic Tracers
Chicago	Jan. 17	Furniture Club of America	H. K. Work	Research in Steelmaking
Cincinnati	Jan. 13	Engineering Society	R. S. Busk	Application of the Electron Microscope to Magnesium Metallurgy
Cleveland	Jan. 10	Cleveland Club	G. R. Gohn	Fatigue and Its Relation to Mechanical and Metallurgical Properties of Metals
Columbus	Jan. 11	Fort Hayes Hotel	Robert H. Aborn	Metallurgy of Ferrous Welding
Dayton	Jan. 5		S. C. Fletcher	How to Reduce the Cost of the Tool-steel You Are Using
Detroit	Jan. 10	Rackham Memorial Bldg.	Harry W. McQuaid	Metallurgical Design Factors in Automotive Economics
Georgia	Jan. 31	Henry Grady Hotel, Atlanta	H. P. Croft	Industrial Uses of Copper Alloys
Hartford	Jan. 11	The Hedges, New Britain, Conn.	J. C. Fox	Die Castings
Kansas City	Jan. 19	Fred Harvey's Pine Room	E. Hartshorne	Metallurgy of Civilian Ammunition
Los Angeles	Jan. 27	Rodger Young Auditorium		Silver Anniversary Jubilee
Louisville	Jan. 4		W. E. Benninghoff	Differential Hardening and Heating by Induction
Mahoning Valley	Jan. 11	V. F. W. Hall	H. K. Work	Cold Working of Steel
Milwaukee	Jan. 18	City Club	H. K. Work	New Developments in Steelmaking
Montreal	Jan. 3	Queen's Hotel	Eric C. Winsborrow	The Nature of Cast Iron
New Haven	Jan. 20	Conn. Light & Power Co. Auditorium, Waterbury	G. R. Gohn	Fatigue, and Its Relation to the Mechanical and Physical Properties of Metals
New Jersey	Jan. 17	Essex House, Newark	Howard E. Boyer	Adaptation of New Metallurgical Knowledge to Practical Heat Treatment of Steels
North West	Jan. 20	Covered Wagon, Minneapolis	E. E. Thum	Implications of Atomic Energy
Notre Dame	Jan. 19	Engineering Audit., University of Notre Dame	Harold K. Work	Research on Steelmaking
Ontario	Jan. 7	Royal York Hotel, Toronto	O. W. Ellis	Powder Metallurgy
Ottawa Valley	Jan. 4	Bureau of Mines	K. F. Tupper	The Metals of Atomic Energy
Penn State	Jan. 11	Mineral Industries Art Gallery	L. L. Ferroll	Supersonic Testing
Philadelphia	Jan. 28	Engineers' Club	Fred P. Peters	Management Looks at the Metallurgist and Vice Versa
Pittsburgh	Jan. 13	Roosevelt Hotel	Tracy C. Jarrett	Modern High-Strength Cast Irons
Purdue	Jan. 18	Purdue Memorial Union	A. B. Kinzel	Metallurgy of Welding
Rhode Island	Jan.			January Thaw
Rockford	Jan. 26	Faust Hotel	K. A. Dean	Induction Heating and Its Application
Rocky Mountain				
Denver	Jan. 21	Oxford Hotel	Wm. Davis	Spectrochemical Analysis of Metals
Pueblo Group	Jan. 20	Minnequa Club	Wm. Davis	Spectrochemical Analysis of Metals
Southern Tier	Jan. 10	Hotel Bonney, Athens, Pa.	J. S. Vanick	Recent Progress in Gray Cast Iron
St. Louis	Jan. 21	Forest Park Hotel	Arthur E. Focke	Mechanical Testing
Syracuse	Jan. 4	Onondaga Hotel	W. Adam, Jr.	Salt Bath Heating and Annealing
Terre Haute	Jan. 3	Student Union, Indiana State College		Grinding and Abrasives
Tri-City	Jan. 4		R. L. Templin	Determination and Significance of the Mechanical Properties of Metals
Tulsa	Jan. 11		G. C. Kiefer	Corrosion of Metals
Washington	Jan. 10	Garden House, Dodge Hotel	James R. Long	Titanium and Its Alloys
West Michigan	Jan. 17		Alfred Sugar	Aluminum and Zinc Die Casting
Western Ontario	Jan. 21	Wm. Pitt Hotel, Chatham, Ont.	Winnett Boyd	"The Chinook", Canada's First Jet Engine
Wichita	Jan. 18	Knights of Columbus Hall	J. H. Cooper	Resistance Welding Application
Worcester	Jan. 12	Sanford Riley Hall, Worcester Tech	G. J. Stevens	Machining of Stainless Steels

Development of alloy steels for various uses on railroads.

23b-62. Alloy Steels, the Farm Tractor, and the Full Granary. *Metal Progress,* v. 54, Oct. 1948, p. 507-510.

Muir L. Frey briefly outlines development of suitable alloy steels for agricultural tractors. Glen C. Riegel supplements Mr. Frey's remarks with some notes on two or three specific applications of alloy steels and irons in tractors. Information on hardenability control for steel castings and annealing of alloy steel. Structure and finish after conventional and after isothermal annealing.

23b-63. Deep-Sea Diving Sphere Is Alloy Steel Casting. Vincent Delport. *Foundry,* v. 76, Nov. 1948 p. 153, 156.

Design and production of new "Bathysphere" for Prof. Picard. It is made of cast Cr-Mo-Ni steel. Casting, heat treatment, machining, and inspection procedures.

23c—Nonferrous

23c-55. Die Bedeutung der Spurenelemente in der modernen Forschung und Technik. (The Importance of Trace Elements in Modern Research and Industry.) Herbert Haberlandt. *Mittelungen des Chemischen Forschungsinstitutas der Industrie Osterreichs,* v. 2, July 1948, p. 56-59.

Specific uses of Cd, Be, Ga, Ge, Ce, Nd, In, Th, Ti, V, Mo, W, Li, Sb, and Bi.

23c-56 Hard Metal Carbides Prove Their Versatility. J. S. Gillespie. *Machine and Tool Blue Book,* v. 44, Oct. 1948, p. 137-138, 140, 142, 144, 146, 148, 150, 152-154.

Various applications to machine tools, metal working, and hand tools.

23c-57. The Practical Weigh. *Die Castings,* v. 6, Oct. 1948, p. 25-27, 60-64.

Design improvements in die-cast parts for Toledo scales, and over-all design of new food-weighing scale.

23c-58. Fittings Galore. *Die Castings,* v. 6, Oct. 1948, p. 30-32, 67-68.

Advantages of die casting for electrical fittings and parts. Zn, Al, Sn, Pb, and Cu base alloys are all used.

23c-59. Milling Cutters With Zinc Alloy Cast Body. A. B. Frenkel. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 360. Translated and abstracted from *Stanki i Instrument* (Tools and Instruments), No. 2, 1948, p. 23.

Found to be more satisfactory and cheaper than cast-steel bodies normally used. Manufacture is much simpler, no machining or heat treatment being necessary after casting. The body is die cast under pressure. Composition is 4.75% Al, 0.07% Mg, 0.08% Cu, 0.01% Pb, 0.05% Fe, remainder Zn.

23c-60. Experience Picks a Roof. *Inco Magazine,* v. 22, Fall 1948, p. 11-12.

Use of monel roofing on two buildings of Pittsburgh Plate Glass Co.'s Natrium, W. Va. plant. This alloy successfully resists the severe corrosion conditions present.

23c-61. Novel Design Adds to Valve Life. *Inco Magazine,* v. 22, Fall 1948, p. 13.

Jenkins gate valve has monel seat rings. Wedges can be replaced whenever worn.

23c-62. A Precious Metal of Many Uses. *Inco Magazine,* v. 22, Fall 1948, p. 22-24.

Rhodium has high value as an electrodeposited finish because of its appearance, resistance to wear and corrosion, and exceptional brightness. Properties and methods.

23c-63. Rhenium; Recent Developments and Possible Applications. J. G. F. Druce. *Industrial Chemist and Chemical Manufacturer,* v. 24, Oct. 1948, p. 683-684.

10 ref.

23c-64. Use of Monel in Iron and Steel Pickling Equipment. *Iron Age,* v. 162, Oct. 21, 1948, p. 82. From a technical bulletin of International Nickel Co.

Conclusions based on plant experience.

23c-65. The Design, Construction and Maintenance of Burning Tool Equipment. A. Rasmussen. *Finish,* v. 5, Nov. 1948, p. 43-44. A condensation.

Use of special Ni-Cr-Fe alloys in construction of tools and fixtures for carrying pieces during the enameling process.

23c-66. Galvanized Nails Help Maintain Life and Beauty of Roofing and Siding. *Paint Progress,* v. 7, no. 3, [1948], p. 8-9.

Comparative results obtained with galvanized and ordinary nails. The latter cause unsightly siding stains and disintegrate through corrosion.

23c-67. When You Consider Using Aluminum Wire and Cable. G. A. Van Brunt. *Factory Management and Maintenance,* v. 106, Nov. 1948, p. 126-128.

Comparative properties and factors to be considered in choosing between copper and aluminum as electrical conductors.

23c-68. Sound Styling. *Die Castings,* v. 6, Nov. 1948, p. 23-24, 61-62.

Use of die-cast zinc grille and fittings for portable radio.

23c-69. And Now — Television. *Die Castings,* v. 6, Nov. 1948, p. 33-35, 65.

Various uses of Zn and Al die castings in television sets.

23c-70. Paris Fashions. H. K. Barton. *Die Castings,* v. 6, Nov. 1948, p. 36-38, 66-67.

Miscellaneous die-cast products exhibited at the Paris Trade Fair this year.

23d—Light Metals

23d-163. Nové pouziti alkalickych kovu. (New Uses for Alkali Metals). Jan Korecky. *Hutnické Listy,* v. 3, March 1948, p. 80-81.

Uses of Na and Li in deoxidation of alloy steels; various reactions with oxides of Fe, Ni, and Cr; and reactions of Li with H_2O, O_2, and CO.

23d-164. Decorative Laminate With an Aluminium Core. *Plastics,* (London), v. 12, Sept. 1948, p. 467-469.

New type of decorative sheet material developed in England; and its properties, especially with regard to non-inflammability.

23d-165. Le wagon tombereau en alliages legers. (Light-Alloy Railway Hopper Cars.) Jacques Valeur. *Revue de l'Aluminium,* v. 25, Sept. 1948, p. 279-288.

Details of design and use of light alloys.

23d-166. All Aluminum Highway Bridge to Span Saguenay River in Canada. *Civil Engineering,* v. 18, Oct. 1948, p. 42-43.

Canadians will erect world's first all-aluminum bridge between Arvida and Shipshaw. At Arvida also, another "first" in aluminum construction is being realized—an all-aluminum overhead traveling crane of 15-ton capacity, about to be installed in the rod mill of the Aluminum Co. of Canada.

23d-167. Sound Board for Harringay Arena; Aluminum Replaces a Previous Tubular Steel Structure. *Metallurgia,* v. 38, Sept. 1948, p. 292.

23d-168. Phenolic Bonded Metal-Wood Sandwich. *Modern Plastics,* v. 26, Oct. 1948, p. 82-83.

Manufacture of laminate in which a phenolic resin adhesive is used to bond aluminum-alloy faces to a balsa-wood core.

23d-169. Aluminum Exploration Equipment Has Advantages in Gulf Coast Marshes. Leigh S. McCaslin, Jr. *Oil and Gas Journal,* v. 47, Oct. 14, 1948, p. 88-89.

Exploration equipment ranging from portable shot-hole drills to gravity-meter station platforms is now being made of aluminum for use in the inland marine areas of the Gulf Coast. Light weight and corrosion resistance are important factors. Use of magnesium is being considered.

23d-170. Magnesium in the B-36. *Light Metal Age,* v. 6, Oct. 1948, p. 20.

Various applications.

23d-171. Aluminum Alloys. R. H. Brown and E. D. Verink, Jr. *Industrial and Engineering Chemistry,* v. 40, Oct. 1948, p. 1776-1777.

Developments of past year which have led to new applications in chemical-process equipment, and containers, where corrosion is a factor. 15 ref.

23d-172. Water-Powered Dishwasher. *Modern Metals,* v. 4, Oct. 1948, p. 26.

Substitution of aluminum for steel in this application.

23d-173. Aluminum and Magnesium Castings for Underwood's All Electric Typewriter. *Modern Metals,* v. 4, Oct. 1948, p. 28.

23d-174. Lightweight Licenses; Another End Use for Aluminum. *Western Metals,* v. 6, Oct. 1948, p. 31.

Production of aluminum tags for Washington State.

23d-175. Aluminum Foil Fire Fighting Suit Reflects Heat Radiation. *Technical Data Digest,* v. 13, Nov. 1, 1948, p. 8-9.

Tests have proven superiority of this suit for fire fighting. Consideration of use for the inner layer of Arctic garments is being given.

23d-176. New Uses Expand Aluminum Casting Applications. Floyd A. Lewis. *Steel,* v. 123, Nov. 1, 1948, p. 84-88, 90.

23d-177. Magnesium Alloy Applications in Germany During the War. Hubert Altwicker and Ernst Josef deRidder. *Magnesium Review and Abstracts,* v. 7, July 1947, p. 43-83.

Previously abstracted from *Modern Metals,* v. 3, Jan. 1948, p. 15-19; v. 4, Feb. 1948, p. 20-24; March 1948, p. 26-30; June 1948, p. 24-27; July 1948, p. 20-22. See item 23d-40, 1948.

23d-178. The Aluminum Tap. *Light Metals,* v. 11, Oct. 1948, p. 530-531.

Use of aluminum faucets in Hungary and modifications in design and fabrication found necessary on substitution of Al for brass.

23d-179. Bobbins for the Textile Industry. *Light Metals,* v. 11, Oct. 1948, p. 536-548.

Production, properties, and applications of Al-alloy bobbins.

23d-180. The Potentialities of Aluminium and Its Alloys for the Paper-Making Industry. *Metallurgia,* v. 38, Oct. 1948, p. 340-341. Based on paper by F. W. Rogers.

23d-181. Instrument Design: An Optical Pyrometer. *Die Castings,* v. 6, Nov. 1948, p. 28-30, 62-65.

Use of Al die castings.

23d-182. Mining with Aluminum Cable. *Coal Age,* v. 53, Nov. 1948, p. 84-85.

Weight and cost advantages. How three Alabama organizations use the insulated aluminum type for both high and low-voltage service.

For additional annotations indexed in other sections, see: 8-257; 27b-45.

Hollomon Expounds Theory of Slip

Reported by Alexander Lesnewich
Rensselaer Polytechnic Institute

Pointing out the lack of basic understanding of the behavior of metals, J. H. Hollomon of General Electric Co.'s research laboratory discussed "Yielding and Workhardening" before 80 members of the Eastern New York Chapter at the first dinner meeting of the 1948-49 season. Dr. Hollomon confined the majority of his talk to the mechanism of slip.

Deformation, he said, may occur by twinning or slip at low temperatures and, in addition, by the relative motion of grains and grain boundaries at high temperatures. The actual slip may be produced by a uniform motion across an entire grain or, more probably, by propagation across the grain along a favorable lattice plane in a favorable direction. Homogeneous yielding is common in the great majority of metals. Low-carbon steels are usually observed to produce a yield point jog which is indicative of heterogeneous yielding.

Because of the numerous discontinuities present, polycrystalline materials have higher resistance to slip than single grains. Likewise, in steels, the presence of precipitated particles increases resistance to deformation by limiting the amount of slip. The shape of the carbides is of secondary importance; plates of pearlite or spheroids of carbide produce the same strengthening effect if their separation is of similar magnitude.

Dr. Hollomon expressed the sentiment that, although the knowledge of the mechanism of slip may not be entirely correct, a better understanding of metallic behavior will produce cheaper and better metals.

G. E. Fellowships Offered

Applications are now being accepted for research grants under the General Electric Education Fund for the scholastic year of 1949-50. Aid in grants up to $1500 annually will be awarded to college graduates who wish to continue individual study and research in scientific and industrial fields.

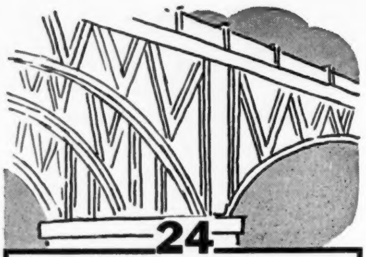
Applications for the grants, known as the Charles A. Coffin fellowships and the Gerard Swope fellowships, must be filed by Jan. 1, 1949. They should be mailed to the secretary, General Electric Co. Education Fund, Schenectady, N. Y.

Technical Papers Invited for Western Metal Show

The Publications Committee is now receiving papers to be considered for presentation at the Western Metal Congress to be held in Los Angeles, April 11 to 15, 1949, and also for subsequent publication in *Transactions*. One of the requirements for presentation in Los Angeles is that the author present the paper in person. The closing date for receipt of manuscripts is Feb. 1 and all papers must meet the approval of the Publications Committee.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.



24 DESIGN and STRESS ANALYSIS

24a—General

24a-214. Production and Inspection of Cycle Tyre Valves. *Machinery* (London), v. 73, Sept. 16, 1948, p. 431-439.
Details of design, and of machining and inspection procedures at British firm.

24a-215. Analysis of Press Performance. Given A. Brewer. *Product Engineering,* v. 19, Oct. 1948, p. 81-85.
Results of investigation of performance characteristics of a punch press under service conditions. Study of test data reveals that performance could be doubled by reducing the over-all co-efficient of friction in the bearings without changing design of other parts.

24a-216. Applying Torsion Bar Springs. Donald Bastow. *Product Engineering,* v. 19, Oct. 1948, p. 104-106.
Methods of shortening spring length and relationships between energy storage, stress level, diameter, lever length, and load.

24a-217. Rotary Contour Formed Parts. Cyril J. Bath. *Product Engineering,* v. 19, Oct. 1948, p. 117-120.
New possibilities for using one-piece metal parts having long, compound curves, such as bus bumpers, airplane cowls, and many others.

24a-218. Design for Welding. T. B. Jefferson. *Welding Engineer,* v. 33, Oct. 1948, p. 33-48.

24a-219. Research Data on Sheet-Stringer Panels. *Aviation Week,* v. 49, Oct. 4, 1948, p. 22-24.
Methods used and results of studies conducted at National Bureau of Standards for experimental confirmation of theoretical analyses.

24a-220. An Investigation of the Stress and Strain States Occurring in Bending Rectangular Bars. G. S. Sangdahl, Jr., and G. Sachs. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 1-18.
Material, equipment, and procedures. Results for plastic bending and fracturing characteristics. 29 ref.

24a-221. A New Material for Three Dimensional Photoelasticity. M. M. Leven. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 19-34.
New styrene-alkyd resin material, known as "Fosterite" and having properties for "frozen stress" tests superior to any other known material. Characteristic curves showing the variation of physical and optical properties with temperature and duration of load application for the styrene-alkyd class of resins. "Critical" and "effective" fringe value and modulus of elasticity and the factors affecting these constants.

24a-222. Some Simplifications in the Numerical Solution of Laplace's Equation With Special Applications of Photoelasticity. M. M. Frocht. *Proceedings of the Society for Experimental Stress Analysis.* v. 6, No. 1, 1948, p. 39-43.
In the method described, several straight lines are drawn through a given point in the form of a rosette. Each straight line is viewed as a taut string whose slope is determined by the boundary values of the harmonic function. The initial value of the function at a given point is taken as the arithmetic mean of all the ordinates over the given point.

24a-223. Shock Testing Technology at the Naval Ordnance Laboratory. J. H. Armstrong. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 55-65.
Equipment and procedures.

24a-224. A Photoelastic Study of Stresses in U-Shaped Members. J. B. Mantle and T. J. Dolan. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 66-73.
Results of an investigation of stress distribution; and maximum stresses in U-shaped frames with semicircular inner closed ends and rectangular outer closed ends.

24a-225. The Photoelastic Laboratory at the Newport News Shipbuilding and Dry Dock Company. Barron K. Lee, Roscoe Meadows, Jr., and Walter F. Taylor. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 83-110.
The methods and tools of photoelasticity as well as the faults and advantages of the different types of photoelastic equipment. 44 ref.

24a-226. The Equilateral Fleximeter. Given Brewer. *Proceedings of the Society for Experimental Stress Analysis,* v. 6, No. 1, 1948, p. 123-130.
Instrument developed to permit the determination of the state of stress due to bending moments (flexure) alone at any given point on a structure. The Fleximeter used in conjunction with an equilateral strain gage rosette permits the determination of the axial stresses and the stresses on the inaccessible side of the sheet from external measurements alone.

24a-227. Determination of Stress During Plastic Torsion. (In Russian.) N. N. Davidenkov, N. G. Mokievskaya, and M. N. Timofeeva. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, June 1948, p. 720-727.
Investigates experimentally the Ludvik formula for calculation of these stresses by summation of residual and elastic stresses. Experimental procedure and obtained data.

24a-228. A Concluding Article—Flange Design Considerations. Harold E. Lonngren. *Petroleum Refiner,* v. 27, Oct. 1948, p. 145-146.
A new concept of the magnitude of the total external moment in a flange intended to explain numerous cases of failure although hydrostatic tests with as high as five times working pressure failed to show signs of weakness.

24a-229. Steel and Aluminum for Automotive Products Compared. D. F. Toot. *Materials & Methods,* v. 28, Oct. 1948, p. 69-73.
Previously abstracted from *Society of Automotive Engineers, Preprint,* 1948. See item 24a-143, 1948.

24a-230. Testing Highly Stressed Structures. W. B. Miller and E. H. Schwartz. *Product Engineering,* v. 19, Nov. 1948, p. 81-84.
Type of tests applied to aircraft structures at Wright-Patterson Air Force Base.

24a-231. Overstrength of Short Bending Members. Frederick L. Ryder. *Product Engineering,* v. 19, Nov. 1948, p. 110-112.
Stress analysis of short-beam elements. Effects contributing to overstrength. Recommended short-beam factors.

24a-232. Applying the Polariscope. Ray W. Clough. *Product Engineering,* v. 19, Nov. 1948, p. 124-128.
Construction of a simplified polariscope, adaptable for design work in small industrial laboratories, was described in an earlier article. Use of the equipment and interpretation of the data obtained.

24a-233. Sheet Metal Spools—Design and Selection. Wallace C. Mills. *Product Engineering,* v. 19, Nov. 1948, p. 143-147.
Barrel construction, head formation, assembly, and selection in accordance with end use and good sheetmetal practice. Points of weakness and strength.

24a-234. Values and Procedures of AMC's Structural Testing Program. W. B. Miller. *Technical Data Digest,* v. 13, Nov. 15, 1948, p. 19-25.
"A.M.C." is the army's Air Materiel Command.

24a-235. Forging Die Design. The Bender. John Mueller. *Steel Processing,* v. 34, Oct. 1948, p. 527-529.
Principles of design of "benders" in drop-forging hammer dies. They are used to bring the several sections of the stock or prepared blank into proper relationship with the rougher and finisher impression. (To be continued.)

24a-236. Stability of SR-4 Electric Strain Gages and Methods for Their Waterproofing and Protection in Field Service. A. Boodberg, E. D. Howe, and B. York. *Transactions of the American Society of Mechanical Engineers,* v. 70, Nov. 1948, p. 915-920; discussion, p. 920-922.
Previously abstracted from *American Society of Mechanical Engineers, Advance Paper* 47-A-120, 1947. See item 24a-167, 1948.

24b—Ferrous

24b-90. Calculation of Torsional Vibration Stresses in Large Power Plants. A. F. Gogin. *Engineers' Digest* (American Edition), v. 5, Aug. 1948, p. 285-286. Translated and condensed from "Collection of Reports Concerning Dynamic Strength of Machine Parts", Academy of Sciences of the U.S.S.R., Moscow, 1946, p. 44-51.
Previously abstracted from original source. See item 27a-90, 1948.

24b-91. Current Practice in Tractor Transmission Gears. Wayne H. Worthington and Barrett G. Rich. *SAE Quarterly Transactions,* v. 2, July 1948, p. 379-387; discussion, p. 387-389, 400.
Gearing of 11 tractor transmissions under the following headings: basic gear systems in use; gear-form modifications and methods of final finishing; materials and heat treatment; surface compressive stresses; and beam stresses.

24b-92. Theory of Plasticity—Elements of Simple Theory. J. W. Roderick. *Philosophical Magazine,* ser. 7, v. 39, July 1948, p. 529-539.
Elements of the simple theory of flexure, for mild-steel members in the elasto-plastic condition, and extends it to cover the case of bending combined with axial loading.

24b-93. Collapse Resisting Strength of Iron Pipe or Tube. *Asbestos,* v. 30, Sept. 1948, p. 30, 32.
Chart for above and its use.

24b-94. Concerning the Prevention of Deformation in Welded Ship Structures. (In Russian.) R. V. Vroblevskii. *Avtogennoe Delo* (Welding), July 1948, p. 25-26.
Factors causing deformation. A

(Turn to page 54)

MANUFACTURERS' LITERATURE

Use the Handy Coupon to Obtain This Helpful, Free Literature

167. Alloy, Nickel Plating
Lustralloy, a new material in plated metals field which permits uniform nickel plating without the use of electric current. Leaves a bright high-quality finish that is tarnish and corrosion proof. Lustralloy Sales Corp.

168. Die Metal
Bronze die metal that is achieving records in lower production costs featured in bulletin 96 just released. Describes not only Ampco Metal Grades 21 and 22, but also a sensational new bronze die alloy Grade 24, designed for superior performance. Ampco Metal, Inc.

169. Electrodes
New 40-page catalog contains 50 photographs and diagrams, an electrode selector chart and complete details on all electrodes in the Wilson line. Wilson Welder & Metals Co.

170. Finishing
A new manual illustrating and describing roto-finishing in detail with an outline of the four principal procedures—deburring and grinding, polishing, britehoning and coloring. Sturgis Products Co.

171. Forgings
Numbers 1 and 2, Volume 10 of "Forgings" features the farm and petroleum field. Many illustrations and interesting material on forgings for these industries are shown in an attractive manner. Kropp Forge Co.

172. Furnaces, Heat Treating
8-page booklet illustrates gas, oil and electric heat treating and carburizing furnaces. Holcroft and Co.

173. Lab Furnaces
Two new Leco box type furnaces are fully described in a 4-page leaflet; one designed for use in temperatures up to 2900° F. the other for temperatures up to 2600° F. Laboratory Equipment Corp.

174. Metal Cleaning
New 28-page A-F booklet takes the reader through the process of how to select a washing machine. Section devoted to conveyorized systems for specific problems with illustrations and flow charts. Alvey-Ferguson Co.

175. Nickel Plating
"Practical Nickel Plating" is a new booklet on the subject of industrial nickel plating. It discusses solution compositions and operating conditions, and suggests cycles for treatment of the base metals prior to plating. International Nickel Co.

176. Permanent Magnets
An eight-page illustrated bulletin CDM-12 describing GE metallurgical products, including cast and sintered Alnico, Cunife, Cunico, Vectolite, Silmanal, and various permanent magnet holding assemblies. General Electric Co.

177. Plating Equipment
Booklet 148 describes the Meaker design of automatic, semi-automatic, and special machines for plating and other sequence processing. A section devoted to plating data tables. The Meaker Co.

178. Plating Rack Coating
4-page leaflet describes "Enthonite 101" a new liquid plastic plating rack coating. Material also has extensive use for coating metals to resist severely corrosive organic materials. Enthone, Inc.

179. Screw Thread Inserts
Bulletin 248 contains 12 pages of latest design data, tables, applications, and illustrations of Heli-Coil screw thread inserts. Heli-Coil Corp.

180. Seam Welders
An 8-page bulletin No. 804 describes new line of roller head seam welders which embody three basic sizes for light, medium, and heavy duty work, also available in three types—for circular, longitudinal welding, or both. Progressive Welder Co.

181. Stainless Piping
Bulletin 483, a new 4-page booklet includes drawings, dimensions and prices of new type fittings and flanges, available in Stainless 304, 347, 316 and other materials. Taylor Forge & Pipe Works.

182. Stainless Steel
8-page bulletin describes a high alloy low carbon austenitic stainless steel known as Durimet 20, for use with about 125 corrosive solutions. Duriron Co., Inc.

183. Tape, Insulating
A new and improved orange-colored Wrap-Rax, a synthetic resin in easy-to-use tape form for insulating plating racks. Effective as a stop-off in hard chromium and other plating solutions. Hanson-Van Winkel-Munning Co.

184. Tube Testing
Testing machine for hydrostatically testing steel tubes or pipes in sizes from 1" to 4" O.D.; lengths from 10' to 26' and at test pressures ranging from 750 psi to 3000 psi described in bulletin. R. D. Wood Co.

185. Welding Electrodes
New electrode booklet DH 45, "Page Hard Surfacing Electrodes," which contains a description of five new electrodes developed to provide a weld metal deposit whose particular properties are suited to definite welding applications. Page Steel & Wire Div.

186. Welding
All metal joining headaches eliminated in a new 8-page illustrated bulletin containing more than 60 illustrations of how new low temperature welding alloys can save defective equipment and machinery. Also featured is the new cutting electrode, Cuttrode, for cutting metals without the use of special equipment or oxygen. Eutectic Welding Alloys Corp.

READER SERVICE COUPON

Metals Review, December 1948

Circle these numbers for manufacturers' catalogs described on this page:

167	169	171	173	175	177	179	181	183	185
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740	742	744	746	748	750	752
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MAIL TO METALS REVIEW, 7301 *EUCLID AVE., CLEVELAND* 3, *OHIO*

series of suggestions are proposed.

24b-95. Design Considerations for Welded Machinery Parts. Part Two. George L. Snyder. *G. E. Welding Arcs,* v. 14, Oct. 1948, p. 10-14.

24b-96. Stamped Cover Reduces Breakage. *Product Engineering,* v. 19, Oct. 1948, p. 101.

Drawn-steel cylinder covers were adopted for heavy-duty diesel engines to reduce breakage during servicing. Former aluminum castings broke when dropped but the steel stampings are easily hammered back into shape if dented.

24b-97. Modern Trends in Hydraulic Turbine Design. William J. Rheingans. *Electrical Engineering,* v. 67, Oct. 1948, p. 954. Condensed from paper to be published in *AIEE Transactions,* v. 67, 1948.

Use of welded-plate construction and of stainless steel, also self-lubricating bearings and carbon-seal rings.

24b-98. Safe Structural Loads Concentrated at Mid-Spans of Laterally Unsupported Members. *Factory Management and Maintenance,* v. 106, Oct. 1948, p. 132, 134.

Design charts for standard steel structural members.

24b-99. Advance Report of the Committee on Impact and Bridge Stresses. *American Railway Engineering Association, Bulletin,* v. 50, Sept.-Oct. 1948, p. 51-146.

Stresses in a number of different types of bridges were determined during passage of trains and locomotives of different weights. Results are reported in the eight separate reports within the main report.

24b-100. Design and Fabrication of Welded Light-Weight Pressure Vessels. John J. Chyle. *Welding Journal,* v. 27, Oct. 1948, p. 831-837.

Methods for three broad groups of the above vessels. Mechanical properties of the metals used and of their welds. Test procedures and results. Inspection and heat treating methods.

24b-101. Heavy Flexible Beam and Girder Connections. Harry Greaves. *Welding Journal,* v. 27, Oct. 1948, p. 845-849.

Design of all-welded fluid-catalytic-cracking plants. They are 220 ft. high, 43 ft. wide and 126 ft. long. The regenerator vessel weighs 2,175,000 lb.

24b-102. The Future Welded Design of Farm Equipment. Ernest J. Koop. *Welding Journal,* v. 27, Oct. 1948, p. 850-854.

Recommended series of improvements in design of farm machinery which still is largely assembled by use of bolts and rivets.

24b-103. Zur Dauerhaltbarkeit von Formelementen der Welle bei ueberlagerter wechselnder Biege- und Verdrehbeanspruchung. (The Effect of Shaft Design on Fatigue Strength Under Superimposed Alternating Bending and Torsional Stresses.) O. Puchner. *Schweizer Archiv fuer angewandte Wissenschaft und Technik,* v. 14, Aug. 1948, p. 217-229.

Tests were made on normalized carbon steel and drawn Mn-Si steel, each of which was machined into different shapes. 11 ref.

24b-104. Flanged Joint Design for Welded Tubular Steel Structures. Grant A. DeShazer. *Product Engineering,* v. 19, Nov. 1948, p. 117-118.

24b-105. Welded Warehouse Building. *Welding Engineer,* v. 33, Nov. 1948, p. 64.

24b-106. Engineering and Production Ingenuity Behind the Creation of a Fastener. Dan Reebel. *Steel,* v. 123, Nov. 8, 1948, p. 90-94, 124.

Elimination of a simple joining operation plus the realization of substantial savings in assembly labor costs are being experienced by a prominent automotive manufacturer through use of a new type door-lock cylinder retainer. Details of design and production methods.

24b-107. Design for Manufacturing Automobile Bodies. Walter A. Graf. *SAE Quarterly Transactions,* v. 2, Oct. 1948, p. 507-517.

The many activities involved in designing, making and assembling steel automobile bodies. Preparation of the full-size layouts, hardwood die models, and making of dies and assembly tools, plaster cases, patterns, and the cerrobend frame-checking fixtures.

24b-108. Causes and Prevention of Drill Pipe and Tool Joint Troubles. Part 2. Drill Pipe. (Continued.) H. G. Texter, R. S. Grant, and S. C. Moore. *World Oil,* v. 128, Nov. 1948, p. 124, 126, 128, 132.

Various causes of notch-fatigue failures. (To be continued.)

24c—Nonferrous

24c-12. Designing for Die Casting. H. C. Snyder, B. E. Sandell, L. E. Capek, and G. Nielsen. *Product Engineering,* v. 19, Oct. 1948, p. 86-91.

Important factors include choice of material, size, shape, dimensional tolerance, and pressure requirements.

24c-13. Nonferrous Powdered Metal Parts. D. C. Bradley. *Product Engineering,* v. 19, Oct. 1948, p. 107-109.

Typical machine elements pressed from copper, brass, or nickel silver. Some cost less or are more accurate than competitive parts; others have improved electrical characteristics.

24c-14. Die Cast Air Motor. *Die Castings,* v. 6, Nov. 1948, p. 21-22, 58.

Cumulative tolerances and center distances are held within close limits to eliminate gaskets and sealing compounds. Zinc die castings are used for plates, cylinders, pistons, and valves.

24c-15. Aluminum-Copper Cable Connections for Outdoor Stations. *Engineers' Digest* (American Edition), v. 5, Oct. 1948, p. 388. Translated and condensed from *Revue de l'Aluminium,* v. 25, Feb. 1948, p. 65.

New design which is less susceptible to corrosion.

24d—Light Metals

24d-35. Column and Plate Compressive Strength of Extruded XB 75 S-T Aluminum Alloy. George J. Heimerl and J. Albert Roy. *National Advisory Committee for Aeronautics,* Restricted Bulletin No. L 4E26, May 1944, 3 pages (Declassified.)

Results of tests to determine the column and plate compressive strength of extruded XB 75 S-T aluminum alloy, and comparative values for 24 S-T sheet. Stress-strain curves, too.

24d-36. Direct-Reading Design Charts for 75 S-T Aluminum-Alloy Flat Compression Panels Having Longitudinal Straight-Web Y-Section Stiffeners. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics, Technical Note* No. 1640, Aug. 1948, 38 pages.

24d-37. Aluminum as a Structural Material. Part II. Paul Weidlinger. *Progressive Architecture,* v. 29, Oct. 1948, p. 89-92.

Design principles for aluminum structures and typical examples.

24d-38. Effective Extrusion Design in Aluminum. Harold Cohen. *Light Metal Age,* v. 6, Oct. 1948, p. 8-12, 29.

With aluminum, in contrast to the limited number of standard rolled sections available in steel, one can determine the exact section required and have it extruded, since the die cost for special shapes is relatively small. Principles of design.

24d-39. Plate Compressive Strength of FS-1h Magnesium-Alloy Sheet and a Maximum-Strength Formula for Magnesium-Alloy and Aluminum-Alloy Formed Sections. George L. Gallaher. *National Advisory Committee for Aeronautics, Technical Note No.* 1714, Oct. 1948, 23 pages.

Determined from local-instability tests of formed Z-section columns. The critical compressive stress was found to correlate well with the compressive stress-strain curve for the material. An empirical formula was developed for calculating the average stress at maximum load for formed Z-sections and channel sections.

24d-40. Determination of Dynamic Loads in Coach Structures. W. E. Rice and R. O. Ellerby. *SAE Quarterly Transactions,* v. 2, Oct. 1948, p. 571-577, 626.

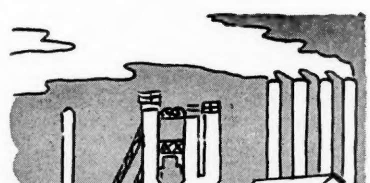
Use of strain gages, especially the SR-4 resistance-wire type. The electronic instruments that must be used in conjunction with this gage and the practical application of such equipment. Construction of the bus bodies referred to is almost entirely riveted aluminum.

24d-41. Aluminum Cylinders—Increase Power, Decrease Weight. A. W. Mall. *Machine Design,* v. 20, Nov. 1948, p. 136-138.

All-aluminum one-cylinder engine used to drive a variety of portable tools. The bores of the die-cast Al cylinders are chromium plated for better heat transfer, wear resistance, and performance.

For additional annotations indexed in other sections, see:

3b-181; 6a-130; 7b-197; 9a-92; 14a-170; 16b-102; 19a-235; 19b-149; 19d-56; 22d-68; 27a-136-138-142-148; 27d-19.



25a—General

25a-53. French Mineral Position. Charles Will Wright. *Mining and Metallurgy,* v. 29, Sept. 1948, p. 497-499.

Possibilities of expanding output and exports to U. S. through Marshall Plan funds.

25a-54. Mineral Position of ECA Nations. No. 1. Germany. No. 2 Austria. John C. Christie. **No. 3. Italy.** Diego Straniero. *Engineering and Mining Journal,* v. 149, Oct. 1948, p. 70-79.

Considerable information concerning location of deposits and produc-

(Turn to page 56)

Three Main Types of Stainless Steel Discussed

Reported by W. R. Jackson

Carboloy Works Engineer
Canadian General Electric Co.

Kenneth A. Matticks, metallurgist, Park Works, Crucible Steel Co. of America, addressed the Ontario Chapter in Toronto on Nov. 5. Mr. Matticks' subject was "Corrosion and Heat Resisting Steels".

Mr. Matticks confined his address to three main stainless types—namely, the nonhardenable nickel-chromium austenitic types, the hardenable chromium types, and the nonhardenable chromium types. He also gave a number of examples of misapplication of corrosion resistant steel.

Technical Chairman J. F. Egan, Railway & Power Engineering Corp., Ltd., Toronto, introduced the speaker.

N. R. C. Appoints New Committee on Ship Steel

A new Committee on Ship Steel, recently appointed by the National Research Council, Division of Engineering and Industrial Research, is made up entirely of metallurgists, all A.S.M. members. The new committee will advise the Ship Structure Committee on a research program intended to develop better understanding of the metallurgical factors influencing the brittle fracture of steel, particularly steel for ship hulls. The personnel is as follows:

Robert F. Mehl, Carnegie Institute of Technology (chairman)

Charles H. Herty, Jr., Bethlehem Steel Co. (vice-chairman)

William W. Baldwin, Jr., Case Institute of Technology.

Charles S. Barrett, Institute for the Study of Metals, University of Chicago.

John E. Dorn, University of Calif.

S. L. Hoyt, Battelle Memorial Institute.

W. M. Lightner, Carnegie-Illinois Steel Corp.

T. S. Washburn, Inland Steel Co.

Finn Jonassen represents the National Research Council as technical director.

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A. S M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

East

ASSISTANT METALLURGIST: College graduate with experience in application and heat treatment of materials. Some knowledge of corrosion necessary. Interesting opportunity in high and low-temperature field. Located near Newark. State qualifications fully and desired starting salary. Box 12-5.

METALLURGIST: New England cutting tool manufacturer has opening for young metallurgist. Knowledge of high speed steels desirable. Splendid opportunity for person to gain wide experience in this field. Box 12-10.

CIVIL SERVICE POSITIONS: Junior Scientist positions in Washington, D. C., and vicinity, and in Florida and California. Mathematicians, metallurgists, and physicists needed. Positions filled on basis of education and experience. No written test required. Salary $2974. Applications accepted until June 30, 1949. Contact regional Civil Service offices or Civil Service Commission, Washington 25, D. C.

Midwest

METALLURGIST: Development and production metallurgist wanted for steel and iron foundry work. Interesting position in well established firm. Preference given to applicants 25 to 30 years old. M.Sc. degree preferred but not necessary. Box 12-15.

PHYSICAL METALLURGIST: Excellent opening for young engineer with some experience in research or development in field of toolsteels or special cast alloys. Prefer man with advanced college training, but not essential. Interest and experience in technical writing desirable. Top salary offered. Metals Dept., Armour Research Foundation, Chicago 16, Ill.

METALLURGICAL ENGINEER: To teach metallurgy and metallography to engineering students in well-known midwestern engineering college. Opportunities exist for graduate study in metallurgy. B.S. degree required. Work to start Jan. 1949. Include complete details in first letter. Box 12-20.

LABORATORY POSITION: For recent graduate with degree in chemistry or metallurgy. Work will consist of research and control on rectifiers and porous tantalum elements. Salary $3000. Box 12-25.

POSITIONS WANTED

SALESMAN: Carbon, alloy, stainless steels; heat treating equipment and service. Twenty years' experience as a heat treater, supervisor and metallurgical laboratory technician, selling heat treating services and trouble shooting. Formally educated in metallurgy. Prefers central and western New York as he has strong following there, but will work any area. Reasonable salary and incentive basis desired. Box 12-30.

METALLURGIST — MATERIALS ENGINEER: Registered engineer. Conspicuous record in materials and process research, development, and control. Chemical and metallurgical engineering training and 11 years' broad experience with metal producing and manufacturing concerns. Desires position as research director or equivalent with progressive organization. Box 12-35.

TEACHER: Graduate of major university in metallurgical engineering. Member of Tau Beta Pi. Four years' industrial foundry, laboratory and forging experience. Previous teaching in physical metallurgy. To start in winter term. Box 12-40.

ENGINEER: Age 43. Ten years of varied tool and machine design experience on presses, screw machines, cold headers, tapping machines, taps, gages, weldments and flame cut parts. Desires position with opportunity for advancement. Box 12-45.

POWDER METALLURGIST: Graduate chemical engineer. Age 35, married. Thirteen years' diversified experience in research, development, production in impregnated diamond tools, synthetic sapphire, cemented carbides, iron powder metallurgy. Desires responsible position with progressive and aggressive organization, preferably in diamond tool or in high-temperature metal-ceramic fields. Box 12-50.

METALLURGIST: B.S. and M.S. in metallurgical engineering. Age 24, single. Two years of broad experience in metallurgical and refractory research in industry. Desires to relocate on the West Coast in position involving metallurgical research. Box 12-55.

METALLURGICAL ENGINEERING GRADUATE: Age 24, Single. B.S. in January 1949 from large midwest university. Desires a responsible starting position with opportunities leading to technical sales or customer service contacts. Former Army officer. Any location. Interested only in companies that normally promote from within the company. Box 12-60.

METALLURGIST: Age 28, married. B.S. degree in metallurgical engineering. Four years' forge shop experience—carbon, alloy, stainless steel and turbine blading materials. Typical metallurgical laboratory, physical testing, metallography, heat treating, investigation of customer and production problems, materials engineering. Position must offer opportunities for training and advancement. Would be excellent assistant. Box 12-65.

CONSULTANT TO METALLURGICAL AND CHEMICAL INDUSTRIES. Available on part-time basis. No job is too small. Specializes in creating and operating a program suited to your particular business for developing new products and markets. Our extensive experience includes working with both small and large companies in development, production and marketing. Primary interest is in companies located in Pennsylvania, New Jersey, New York, Maryland and Delaware. Will consider financial interest in the right companies. Box 12-70.

METALLURGICAL ENGINEER: Desires production, sales or research position on West Coast. Experienced in steel heat treating including tool work; four years' research laboratory work, metallography and physical testing. Lehigh 1937. Box 12-75.

ENGINEER: B.S. in chemical engineering, 1944. Graduate work in powder metallurgy, in service experience in electronics, employed two years in chemical research. Age 25, single. Desires position with small concern in northern New Jersey. Box 12-80.

METALLURGIST: Age 34, B.S. in chemical engineering. Twelve years' experience in all phases of production heat treating including supervision of quality control, production methods, and customer service contacts while chief metallurgist of large heat treating plant. Desires position as chief metallurgist or sales engineer. Box 12-85.

CHEMIST — METALLURGIST: Age 36, available immediately. Ten years as assistant chief chemist, toolsteels and stainless. Seven years as chief chemist and metallurgist and one year as plant superintendent. Willing to travel anywhere. Box 12-90.

The Scientists' and Engineers' Association, recently organized as a nonprofit corporation, has as a major purpose to encourage the most efficient use of scientific and engineering knowledge and experience. To further this purpose, the Association has organized a service which specializes in placing scientists and engineers in employment connections throughout the United States. Many good jobs in metallurgical and associated fields are now open. Further information may be obtained by writing the Scientists' and Engineers' Association, Rock Rimmon Rd., Stamford, Conn.

tion facilities, present and planned production, and other factors involved.

25a-55. Impact of ECA on Mining Industry. Evan Just. *Metals,* v. 19, Oct. 1948, p. 11-12.

25a-56. Directory of Materials. Fifteenth Edition. *Machine Design,* v. 20, Oct. 1948, p. 223-290, 292, 294, 296-298, 300, 302, 304, 306, 308, 310.

Devoted exclusively to tradenamed engineering materials used for fabrication into machine parts. Materials listed by tradenames; standard stainless steels; stainless steels—tradenames and producers; index of materials by type; and materials producers.

25b—Ferrous

25b-85. New West Coast Tinplate Mill Means 300,000 Tons More Finished Steel for Industry. Bill Packard. *Iron Age,* v. 162, Oct. 21, 1948, p. 114-116.

New cold rolled sheet and tin plate mill at Columbia Steel at Pittsburg, Calif., and its significance to western consumers.

25b-86. Sveriges järn-och stalexport. (Swedish Iron and Steel Export Trade). Sven L. Wahlström. *Jernkontorets Annaler,* v. 132, no. 9, 1948, p. 271-313; discussion, p. 313-314.

History of above and its ups and downs. Statistical data covering 1831-1946. 16 ref.

25b-87. Trends in Use of Alloy Compositions for Heat Resistant Castings. E. A. Schoefer. *Industrial Heating,* v. 15, Oct. 1948, p. 1720, 1722, 1726, 1728, 1730, 1829-1831.

Discussion is mainly limited to the Fe-Cr-Ni types.

25b-88. Iron Deposits; Labrador and New Quebec. W. M. Bonham. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 199-201, 204.

25b-89. Southern Metals Output Doubles Since Prewar. Caldwell R. Walker. *Manufacturers Record,* v. 117, Nov. 1948, p. 58-59.

Presents data broken down by states.

25b-90. Basic Metal Plants Expanding in South. Sidney Fish. *Manufacturers Record,* v. 117, Nov. 1948, p. 60, 63.

Statistical data.

25c—Nonferrous

25c-67. Present Rate of Consumption of Copper, Lead and Zinc May Hold for 2 to 3 Years. Simon D. Strauss. *Metals,* v. 19, Oct. 1948, p. 7-10, 17.

But it does not follow that prices will continue to rise or that present prices will be maintained.

25c-68. Gold in Quebec. H. R. Rice. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 182-196.

Statistical data for the principal mines; historical background; and flow sheet for a typical mill.

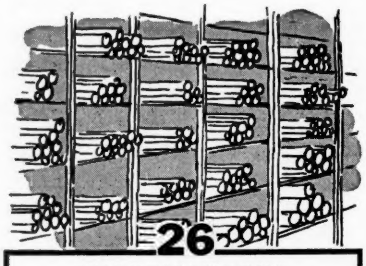
25d—Light Metals

25d-21. Outlook for Magnesium in Canada. J. D. Barrington. *Modern Metals,* v. 4, Oct. 1948, p. 18-20.

Mining background, production, Canadian fabricators, availability, and product development.

25d-22. Rearmament Program Exerting Little Demand for Magnesium. John Anthony. *Iron Age,* v. 162, Nov. 4, 1948, p. 165-166.

Supply, production, prices, and demand.



26 MISCELLANEOUS

26a—General

26a-87. Bearing Construction and Performance Characteristics. E. Crankshaw and K. Scheucher. *Iron and Steel Engineer,* v. 25, Sept. 1948, p. 109-116; Discussion, p. 116-119.

The performance characteristics of bearings of the different alloys and of different designs. Also describes effect of method of casting on microstructure and consequent effect on bearing performance. Examples of bearing failures and their causes.

26a-88. New Swedish Metal Research Institute Opened. Erik O. Lissell. *Foundry,* v. 76, Oct. 1948, p. 142, 145.

26a-89. Laboratory for Study of Cylinder Wear. *Technical News Bulletin* (National Bureau of Standards), v. 32, Oct. 1948, p. 115-117.

Facilities of new National Bureau of Standards laboratory.

26a-90. Boundary Friction. *Petroleum,* v. 11, Oct. 1948, p. 226-228.

Results of research on the boundary lubrication of journal bearings at Liége University, Belgium, as reported in a paper by Lucien Leloup. Equipment and procedure and results with a series of lubricants.

26a-91. Production Engineering Research Association. D. F. Galloway. *Metallurgia,* v. 38, Sept. 1948, p. 279-282.

Facilities and activities of British association. Immediate problems are machinability and formability of metals.

26a-92. Temperature Distribution in the Bush of a Journal Bearing. D. Clayton and M. J. Wilkie. *Engineers' Digest* (American Edition), v. 5, Sept. 1948, p. 333-336. Condensed from *Engineering,* v. 166, July 16, 1948, p. 49-52.

Previously abstracted from original source. See item.

26a-93. Metallurgical Research at the National Physical Laboratory. N. P. Allen. *Metallurgia,* v. 38, Sept. 1948, p. 267-270.

Salient features are outlined. Use of phase-contrast illumination in microscopy and to the replica technique in electron microscopy. Work on the effect, on creep strength, of a precipitate in a soft matrix and on the appearance of sigma phase in Fe-Ni-Cr alloys, and the possible future of the higher-melting-point metals.

26a-94. A.F.S. Uses Punch Card System to Index Foundry Literature. *American Foundryman,* v. 14, Oct. 1948, p. 29-35.

Punch-card system and code index developed along lines of divisional and committee interests. Use of duplicate cards in case indexing under more than one subject is necessary.

26a-95. Lubricating Aerosols. K. C. Mosier. *Lubrication Engineering,* v. 4, Oct. 1948, p. 217-219.

Use of air-oil fogs or "lubricating aerosols" for continuous, automatic lubrication. Examples of successful application to lubrication of high-speed grinding spindles, as a coolant for various metal-cutting jobs, and as a drawing and stamping lubricant.

26a-96. Methods of Lubricating High-Speed Ball Bearings. A. F. Brewer. *Machinery,* v. 55, Oct. 1948, p. 172-178.

Various lubrication systems and their pros and cons.

26a-97. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery,* v. 55, Oct. 1948, p. 179-191.

Alloys and materials used in connection with miscellaneous metal-processing applications.

26a-98. Metallurgical Research Now Centered at Midvale. L. A. Creglow. *Mining and Metallurgy,* v. 29, Oct. 1948, p. 556-557.

Research activities of U. S. Smelting, Refining and Mining Co., at Midvale, Utah.

26a-99. Materials at Work. *Materials & Methods,* v. 28, Oct. 1948, p. 92-94.

Ethyl cellulose arc welding holder; aluminum eave troughs; bender for large diameter mild-carbon-steel pipe; molded nylon machine part; vinylidene chloride tubing and fittings; translucent acrylic diffusion panel for providing the light necessary for accurate interpretation of radiographs; and die-cast magnesium furniture.

26a-100. International Conference on the Physics of Metals: Amsterdam, July 1948. Bruce Chalmers. *Research,* v. 1, Oct. 1948, p. 596-601.

Reviews papers presented.

26a-101. Vacuum Metallurgy. Robert A. Stauffer. *Chemistry & Industry,* Oct. 9, 1948, p. S19-S26.

Equipment and procedures for vacuum coating of metals; for their preparation, refining, melting, and heat treatment. 54 ref.

26a-102. Industrial Applications of Radioisotopes. *Iron Age,* v. 162, Oct. 28, 1948, p. 67.

Applications of special interest in the metalworking field: studies of the mechanism of diffusion in metals and material transfer in both dry and lubricated friction.

26a-103. The Importance of Chemical Attack in the Lubrication of Metals. F. P. Bowden. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 654-658.

Experimental results which show that the theory that boundary lubrication by long-chain fatty acids or other hydrocarbons is due to an

(Turn to page 58)

NEW PRODUCTS IN REVIEW

MICROSCOPES (740)

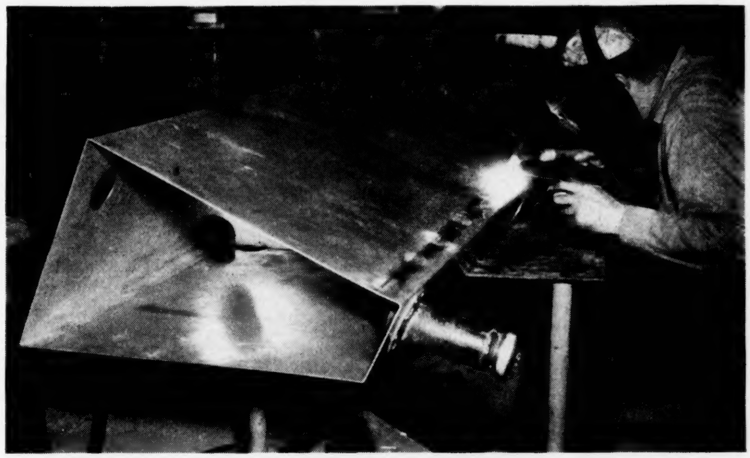
A new series of wide-field microscopes provides a greater field of observation than ever before attained. Consisting of 15 basic models that can be interchanged into 58 different combinations for medical research, industrial and educational purposes, the microscopes' optical systems are completely sealed to prevent dust from reaching the interior.

One of the models is an elaborate instrument for use in surface examination, which can be used to inspect a circular area 5 ft. in diameter.

All eyepieces and objectives are of new design. The objectives minimize image deterioration at the edge of the field of view, while the eyepieces provide a higher eye point for greater comfort. Four positions are provided for a new illuminator and fluorescent lamp.

For further information write Al Blum, Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y., or use coupon on page 53, circling No. 740.

HELIARC WELDING OF ALUMINUM FUEL TANKS (741)



Clean, Corrosion-Free Welds Were Demanded of the Fabrication of These Aluminum Fuel Tanks. Each tank required approximately 40 ft. of welding. Specifications required that all inside surfaces affected by welding be cleaned of scale, weld spatter, foreign matter, and also treated for corrosion. The fabricator eliminated these operations by using the Heliarc inert-gas shielded-arc welding process. The tanks were fabricated from 10-gage, 3S-½H aluminum and all welding was done with the Heliarc HW-4 torch. For further information write John McCracken, Linde Air Products Co., 30 East 42nd St., New York 17, or use coupon on page 53, circling No. 741

PREFORMS FOR FORGING (742)

The Reduceroll, a new machine designed to reduce or preform forging blanks by rolling, has been developed to distribute stock accurately to meet the requirements of final forging. The Reduceroll is a separate unit and can be used in connection with hammers or forging presses.

This new machine eliminates the costly, time-consuming fullering and edging operations necessary to prepare blanks prior to impression die forging in a hammer. Requiring practically no skill to operate, it preforms in quantity. Blanks are uniform and free of shuts and folds.

The Reduceroll is equipped with an air-controlled friction clutch, tripped for each pass by foot pedal. The rolls are overhung to permit easy feeding, accessibility and quick change. The upper roll shaft runs in eccentric bushings which permits adjustment of the center-to-center distance of the roll shafts.

For further information write E. M. Frost, National Machinery Co., Tiffin, Ohio, or use coupon on page 53, circling No. 742.

DIAMOND PENETRATORS (743)

Two improved diamond penetrators for Rockwell testing are the Clark "C" penetrator, which fits all makes of hardness testers for standard Rockwell testing, and the "S" penetrator, which fits all machines for superficial Rockwell testing. Diamond points are specially selected for proper stratification and freedom from internal stresses. Holders are designed to precisely correct angles and radii. The penetrators are accurately made to proper size and shape.

A Clark diamond penetrator is furnished as a standard accessory on all Clark hardness testers, both for standard and for superficial Rockwell testing.

For further information, write C. W. Clark, Jr., Clark Instrument, Inc., 10200 Ford Rd., Dearborn, Mich., or use coupon on page 53, circling No. 743.

WET CUTTING SYSTEM FOR BAND SAW (744)

A self-contained wet cutting system is now available for the Wells No. 5 utility model horizontal metal cutting band saw. Experience on Wells Models No. 8 and 12, has proved that such flushing systems permit safe use of higher cutting speeds and increase blade efficiency. The complete system includes fluid tank with centrifugal-type pump-motor unit and a screened intake, as well as tubing and a conveniently located flow control valve. The full area chip pan is firmly mounted between the bed and legs.

For further information write Walter Morton, Jr., Wells Mfg. Corp., Three Rivers, Mich., or use coupon on page 53, circling No. 744.

oriented layer of adsorbed molecules on the surface of the metal is an oversimplification, and that chemical attack plays an important part.

26a-104. The Lubrication of Metals by Compounds Containing Sulphur. E. B. Greenhill. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 659-669.

Mechanism of the action of e.p. lubricants using sulphur-containing compounds of known composition and structure. These results support the view that all e.p. lubricants function as a result of chemical reaction with the moving surfaces. E.p. lubrication becomes a problem in controlled corrosion. 10 ref.

26a-105. The Lubrication of Metals by Compounds Containing Chlorine. J. N. Gregory. *Journal of the Institute of Petroleum,* v. 34, Sept. 1948, p. 670-676.

It is shown that compounds containing reactive chlorine atoms can produce on steel surfaces a film of iron chloride which has extremely good frictional properties, and which will maintain these properties to very high temperatures.

26a-106. Quebec Department of Mines Laboratories. Maurice Archambault. *Canadian Mining Journal,* v. 69, Oct. 1948, p. 138-145.

Organization and facilities.

26a-107. Recent Advances in the Study of the Crystalline State. Lawrence Bragg. *Science,* v. 108, Oct. 29, 1948, p. 455-463.

An address.

26a-108. Lubricating Open Gears. Joseph A. Rigby. *Steel,* v. 123, Nov. 8, 1948, p. 106, 109, 135.

Physical properties required; selecting correct lubrication; improvements in test procedure; and recent accomplishments.

26b—Ferrous

26b-33. Lubricants for Cold Rolling Steel. R. J. Nekervis and R. M. Evans. *Iron and Steel Engineer,* v. 25, Oct. 1948, p. 72-80, discussion, p. 80-81.

Progress report on an investigation in which a substitute for palm oil was sought. Chemical factors, and lubricant requirements which had to be considered. Lubricating properties were evaluated by measurement of friction coefficient on a laboratory cold rolling mill. Methods of determining rolling performance and effect of workhardening on lubricant ratings and methods for evaluating cleaning properties and luster. Study of palm oil and its fractions and of various types and blends indicated little difference in coefficient of friction and luster.

26b-34. Alloy Steel in War—Then and Now. Clyde Williams. *Metal Progress,* v. 54, Oct. 1948, p. 485-488, 490.

The development of metallurgical materials, especially during the past 75 years and during World War II, for use in the machinery of war.

26b-35. The Technical Trends in Steel Research. E. C. Bain. *Blast Furnace and Steel Plant,* v. 36, Oct. 1948, p. 1222-1225, 1240. A condensation.

Previously abstracted from *Steel Processing,* v. 34, Aug. 1948, p. 432-433, 439-441; Sept. 1948, p. 477-478, 494. Condensed from a lecture reviewing progress in research.

26b-36. Equipment for the Steel Plant. *Metals Review,* v. 21, Oct. 1948, p. 11, 13, 15, 17.

Commercial products, processes, and techniques developed during the past 12 months under headings: blast-furnace refractories; other refractories; handling equipment; casting methods; new steels; mill equipment; sheet, strip and wire; and laboratory equipment.

26b-37. Metallurgical Books. Sibyl E. Warren. *Metals Review,* v. 21, Oct. 1948, p. 33, 35, 37, 39, 41.

Seventh installment of classified bibliography of books published during 1936-1946, inclusive, consists of sections on metals in general and their analysis, and the various sections and subsections dealing with ferrous metals.

26b-38. Quebec-Labrador—Canada's Iron Ore Jackpot. Tom Campbell. *Iron Age,* v. 162, Nov. 4, 1948, p. 155-161.

The story of new ore development, its personalities, prospects, and present status.

26b-39. Onderzoekingen van Franse Metaallaboratoria over speciale staalsoorten. (French Metallurgical Research on Special Steels). André Michel. *Metalen,* v. 3, Oct. 1948, p. 31-35.

Some developments of the past five years on temper brittleness; overheating and temper brittleness; impact values; influence of texture on mechanical properties; properties of steel; corrosion embrittlement of steel; properties of bainite structures; and creep. (To be continued.)

26d—Light Metals

26d-6. Aluminium Laboratories Limited. A. W. J. Dyck. *Canadian Chemistry and Process Industries,* v. 32, Sept. 1948, p. 830-834.

Facilities of research laboratory at Kingston, Ont.

26d-7. Aluminum Company of America Sums Up Its Research in Housing With an Experimental Aluminum Home. *Sheet Metal Worker,* v. 39, Oct. 1948, p. 42-43.

27a—General

27a-136. Machine Design. M. F. Spotts. 395 pages. Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. $6.65.

Chapters on stress, torsion and strength of materials provide fundamental information necessary for the design of machinery. Confined mainly to machine elements, such as springs, screws, gears, bearings, and belts. Engineering materials, giving characteristics and properties of each along with general definitions.

27a-137. Infra-Red Heating. A. E. Williams. 42 pages. 1947. Emmott & Co. Ltd., Manchester, England. (TP 363 W671i).

The sphere of infrared rays and their applications to industry. Deals with principles of infrared heating, lamp tunnels and ovens, construction of radiant-heat tunnels, and calculation of equilibrium temperatures from heat-transfer data.

27a-138. Involute Gears. W. Steeds. Longmans, Green and Co., Ltd., 6-7 Clifford St., London, W. 1, England. 18s. net.

Straight and helical gears of involute tooth form; bevel and worm gears are not dealt with. Manufacturing processes and the inspection of gears, and most of the copying and generation processes in common use. Modern gear-cutting machinery, gages, and profile-testing instruments.

27a-139. Electroplating: Notes and Problems. Ed. 2. 94 pages. 1948. R. Cruickshank, Ltd., Camden St., Birmingham 1, England. 7s., 6d.

Extensive notes on all phases of the finishing of metals—cleaning and degreasing, barrel polishing and plating, bright dipping, metal coloring, polishing, anodizing and dyeing, and testing. It is essentially a note book and under each heading are given only the main features of each process.

27a-140. Press Die Design and Construction. Parts 1 and 2. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d, net, each part. (Machinery's Yellow Back Series, Nos. 24 and 24a.)

The treatment is concise and the sequence logical. Part 1 deals with basic principles of die design and important details such as guide pins, stock supports, and stops; return-type blanking dies and knockout mechanisms; stops, scrap cutters, and shedder pins for return-type blanking dies; and compound blanking and piercing dies. In Part 2 the more complicated press tools are described—progressive blanking and piercing dies; shear-type piercing and cutting-off tools; slug-type cutting-off dies; and piercing, cutting-off, and forming dies.

27a-141. Powder Metallurgy in Practice. 56 pages. Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England. 3s., 6d. net. (Machinery's Yellow Back Series, No. 23.)

How parts for various purposes may be made by powder metallurgy, and points to be considered in design. The various methods of powder manufacture and powder properties are briefly dealt with. Typical equipment. Examples of specialized powder metallurgy products.

27a-142. Symposium on Internal Stresses in Metals and Alloys. 485 pages. Institute of Metals, 4 Grosvenor Gardens, London, England. 42s. net. (Monograph and Report Series No. 5.)

Thirty-six papers and accompanying discussion presented at joint meeting of Institute of Metals with the Faraday Society, the Institute of Physics, the Institution of Mechanical Engineers, the Iron and Steel Institute, the Physical Society, and the Royal Aeronautical Society, in Oct. 1947. Papers on measurement of internal stresses, origin of internal stresses, their control and removal, and associated effects.

27a-143. International Industry Yearbook. Lloyd J. Hughlett, editor. 414 pages. 1948. Kristen-Browne Publishing Co., New York, N. Y.

This is the first issue of an annual publication planned to summarize the technological progress achieved in the various fields of engineering and industry. A broad review of significant industrial developments.

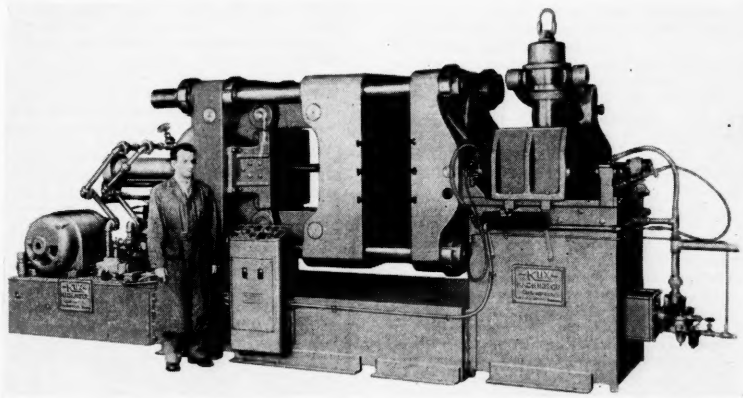
27a-144. Journee des Etats de Surface. (Proceedings of Conference on Surface States.) 87 pages. Société Belge des Mecaniciens, Brussels, Belgium.

Consists of seven lectures which were given at a Brussels conference, together with the introduction and

(Turn to page 60)

NEW PRODUCTS IN REVIEW

DIE-CASTING MACHINE (745)



Kux Model BH-40 Die-Casting Machine

The world's largest standard die casting machine has 800 tons locking pressure and will form castings in zinc weighing up to 30 lb. and in aluminum weighing up to 10 lb. Injection pressures reach as much as 40,000 psi.

With a die space of 40x25 in. between the tie bars and 17-1/2 in. of die separation, the machine can accommodate very large dies and can produce castings having a deep draw.

It is hydraulically operated and electrically controlled by pushbutton. Speed of operation is practically the same as on smaller machines with an average of three to four zinc casting cycles or two aluminum casting cycles per minute.

Three models are available. As a gooseneck plunger-type machine Model BH-40 will produce zinc, lead or tin die castings, and has melting pot and furnace incorporated within the frame of the machine. For aluminum, magnesium or brass, Model HP-40 has a cold-chamber hand-ladling injection unit.

Model BH-40C is constructed as a convertible machine and uses a gooseneck plunger mechanism for zinc castings and a cold-chamber hand-ladling unit for aluminum.

The new Kux injection pressure multiplier is also part of the machines. This unit, by multiplying the ending pressure two to one over the starting pressure, packs the metal into the die to give solid, dense castings.

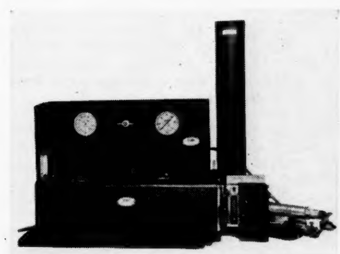
For further information, write James J. Kux, Kux Machine Co., 3940 W. Harrison St., Chicago, or use coupon on page 53, circling No. 745.

SPECTROPHOTOMETER (747)

A new Beckman flame spectrophotometer simplifies analytical procedures by use of a hot flame. The spectral lines of a large number of elements can be excited, including many of the heavy metals and alkaline earths, whereas a cool flame instrument excites only those of the alkali metals. It has a wide spectral range, covering the ultraviolet, visible and near infrared spectral regions.

Samples are atomized and introduced at a uniform rate into a very hot oxygen and gas flame through a specially designed burner. The spectral emission lines of the elements are excited and the spectrophotometer isolates these lines and measures their intensities relative to a blank or standard.

Only small samples are required, and because the samples are ato-



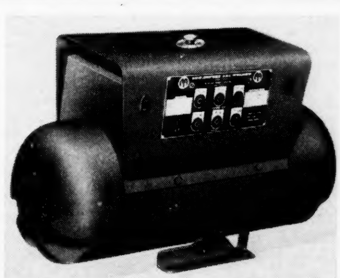
mized directly from external beakers, they can be analyzed very rapidly. A rate of four samples per minute is easily maintained—and rechecks against blanks can be quickly made at any time. Results are instantly and directly readable on an accurately calibrated dial. No photographic processes or densitometer comparisons are necessary.

For further information write Beckman Instruments National Technical Laboratories, South Pasadena, Calif., or use coupon on page 53, circling No. 747.

ARC WELDERS (746)

A new group of a.c. and d.c. arc welding machines forms a companion line to Murex electrodes and M & T welding accessories.

A.c. unit features include built-in power-factor corrector; fingertip, stepless current control; fan-forced ventilation; wide current range; moderate open-circuit voltage operation. Units are of the transformer type, available in 150, 200, 300, 400, and 500-amp. capacities.



These units also provide instant plug-in, plug-out of electrode leads by taper-type connector. Lead interchange is avoided by a permanent work lead connection. Running gear is available where portability is required.

Major design feature of all d.c. models is a one-dial simplified control panel. The panel carries a series of well-marked outlets, each one for an electrode of different diameter. The operator simply plugs into the proper outlet, then dials for any required minor adjustment in current.

Motor-driven d.c. units are available in 150, 200, 300, and 400-amp. capacities in a new compact 3600-r.p.m. model and in the conventional 1750-r.p.m. type. Engine-driven welders include 200, 300 and 400-amp. sets.

For further information write Merritt L. Smith, Metal & Thermit Corp., New York 5, or use coupon on page 53, circling No. 746.

LABORATORY WARE (748)

The Leco line of laboratory ware has recently been expanded by the addition of ignition crucibles, capsules, and incinerating dishes made of the Zircofrax material developed by the Carborundum Co. Such ware will withstand temperatures up to 2600° F. and has good thermal conductivity and excellent resistance to thermal shock. All ware is relatively impervious and has a smooth surface. Sizes range from crucibles for micro work to rectangular dishes 10 in. long by 15 in. high.

For further information write H. J. Schmitt, Laboratory Equipment Corp., St. Joseph, Mich., or use coupon on page 53, circling No. 748.

conclusions by C. Hanocq. Three papers were given by British scientists and engineers, i.e., by G. I. Finch on the structure of sliding surfaces, and by W. E. R. Clay and F. Nourse on the problems of surface finish as seen by the production engineer. P. Nicolau, Paris, spoke on the problems of industrial control with regard to micro-geometrical differences, O. Goche on electron diffraction, and G. Michcalet on improved methods for the micro-geometrical control of surfaces.

27a-145. Electrolytic Polishing and Bright Plating of Metals. S. Wernick. 1948, Alvin Redman, Ltd., Whitfield Place, W-1, London, England. $6.10 plus postage.

Many practical applications of electro-polishing. In addition, results obtained in many experimental tests are cited, pointing the way in which progress can be expected in the near future. The chapter on bright nickel plating is the most complete to be found anywhere, as is the very extensive bibliography of over 500 references. The deposition of precious metals is also covered. (From review in *Metal Finishing,* v. 46, Nov. 1948.)

27a-146. Tvrde Kovy. (Hard Metals.) Evzen Hirschfeld. 274 pages. 1947. Vydalo Nakladelstvo, Prague, Czechoslovakia, £2, 10s.

Application of sintered carbides to cutting tools. An excellent contribution to the problem considering the literature available in practically all industrial countries. There appear to be some original contributions in the form of colored plates, indicating the range of application of various sintered carbides and giving service-data and data on the control of the wear of the cutting edge. Russian, Swedish, and Swiss, as well as English, Czech, American, and German types are included. Lists about 112 articles relating to the subject.

27a-147. Process Engineering. William H. Schutt. 309 pages. 1948. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $4.

Procedure for determining the selling price or direct-labor cost of manufactured article. How to make accurate cost estimates and setup efficient production methods directly from a blueprint. Formulas for speeds and feeds of power presses and other machines. Selection of the proper material for economical production.

27a-148. Uber Die Gleichzeitige Bestimmung Des Elastizitäts—Und Schubmoduls An Hand Der Obertöne Eines in Biegeschwingungen Stehenden Stabes. (On the Simultaneous Determining of Elastic and Shearing Moduli With the Aid of the Modes of Bending Vibration in Bars.) Jaakko Wuolijoki. 79 pages. 1947. Technischen Hochschule Finnlands, Helsinki, Finland.

A new method. Details of mathematics as well as of experimental application to wooden bars. Includes a two-page summary in English. 34 ref.

27a-149. Metalwork; Technology and Practice. Oswald A. Ludwig. 397 pages. 1947, McKnight & McKnight, Bloomington, Ill.

An introductory course to the metal trades. Tools, materials, and operations common to many metalworking occupations. Occupations, hand tools, bench work, power saws, metals, care of equipment, drill presses, screw threads, assembling, sheet metal work, art metal work, forging, casting, tool sharpening, metal finishing, inspecting, lathe work, and metal spinning.

27a-150. Gears, Gear Production, and Measurement. A. C. Parkinson and W. H. Dawney. 260 pages. 1948, Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. $4.50.

General principles. Intended for those in the trade who have gear problems, but who have little or no background of basic knowledge of gear forms, and of the range of manufacturing and measuring methods. Special attention is paid to inspection procedure.

27a-151. Quality Control in Industry; Methods and Systems. J. G. Rutherford. 201 pages, 1948. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. $3.50.

Recommended as a text in industrial engineering courses, this book is also a reference manual for industrial engineers, executives, and supervisors. It covers the organization, administration, and functions of a department. Explaining and illustrating the actual methods of installation, it also gives complete data for the introduction, design and use of statistical sampling techniques. (From review in *Electrical Engineering,* v. 67, Nov. 1948.)

27a-152. Fatigue des Metaux. (Fatigue of Metals.) Ed. 3. R. Cazaud. 318 pages. 1948. Dunod 92, Paris, France. 1650 fr.

The theory and characteristics of fatigue failure of metals in the light of recent developments in the field. Methods and machines for fatigue testing and the influence of various factors on fatigue. The resistance of joints and machine assemblies to fatigue, and to the improvement in endurance of machine parts. Fatigue-limit values for a large number of metals and alloys.

27a-153. Surface Chemistry for Industrial Research. J. J. Bikerman. 464 pages, 1947. Academic Press, Inc., 125 East 23rd St., New York, N. Y. $8.

Fundamentals of surface science —both physics and chemistry—considered in five chapters on liquid-gas surfaces, liquid-liquid, solid-gas, solid-liquid, solid-liquid-gas—solid-liquid-liquid, and electric surface phenomena. Written for men who already know what is being done in their plants and want to know the fundamental explanations of these procedures.

27a-154. The Science and Engineering of Nuclear Power. Edited by Clark Goodman. 540 p. Double spaced typewritten reproduced by photoprinting methods. 1947. Addison-Wesley Press, Inc., Cambridge 42, Mass. $7.50.

It is said that Edwin Reynolds, the mechanical engineering wizard who made Allis-Chalmers a leader in the steam power plant field, designed one of his most important central station installations on the back of an envelope while in a railroad coach traveling eastward from Milwaukee. It may be suspected that this is a myth, but one glance at this data book for the designer of nuclear power plants will prove that such a superhuman feat will never occur again. The first third of the book is occupied with a discussion of nuclear physics, the fission process, neutron diffusion and nuclear reactions, said to be "elementary", but obviously meat for a postgraduate course, elementary only to the professor who teaches it. "Elementary Pile Theory" (the pile is the energy-generating part of the nuclear power plant) also bristles with mathematical formulas; for example we find that critical size of reactor that will just keep itself going can be found by solving simultaneously two differential equations. Elementary, my dear Watson! The remainder of the book is a compendium of quantitative information on the physical, chemical and nuclear properties of most of the chemical elements, included so the designer can select proper material for the component parts of the power plant, with due reference to their high temperature strength, corrosion resistance, stability under radiation, heat transfer, and neutron cross sections. Seven schematic diagrams of promising power plant arrangements are presented and discussed. The authors of the various chapters were lecturers in seminars at Massachusetts Institute of Technology; most of them did important work on the atomic bomb project. The very fact that this work influenced, as it inevitably must be, by this prior service and knowledge about secret weapon developments, could be cleared by the U. S. Atomic Energy Commission for publication is a heartening reminder that a great amount of work done on the atomic bomb turned out to be of small importance to weapons but valuable to the arts of peace. E.E.T.

27b—Ferrous

27b-42. Injury in Ground Surfaces. Ed. 1. L. P. Tarasov. 73 pages. 1947. Norton Co., Worcester 6, Mass.

Types of injury found in the grinding of hard steel, and methods for detecting such defects. Metallurgical and other factors. Suggestions for elimination of surface injury.

27b-43. Sintereisen und Sinterstahl. (Powdered Iron and Powdered Steel). R. Kieffer and W. Hotop. 556 pages. 1948. Springer Verlag, Vienna, Austria. $16.70 (paper bound); $17.50, (cloth bound).

A treatise on ferrous powder metallurgy which has benefited substantially from the authors' well-known earlier work on "Pulvermetallurgie und Sinterwerkstoffe." Bibliographically complete up to early 1948. The book is divided into two parts: powders and processes, and uses. The first part deals with methods of powder manufacture, powder properties, test methods, the pressing operation and properties of pressings, sintering and the properties of sintered compacts, double pressing and sintering, hot pressing, and powder-metallurgy equipment generally. Various types of presses, sintering furnaces, and atmosphere generators.

27b-44. Watkins Cyclopedia of the Steel Industry. Ed. 2. 522 pages. 1948. Steel Publications Inc., 108 Smithfield Street, Pittsburgh. $10.00.

Blast furnaces, coke ovens, rolling mills, pickling, steels, metal finishing and cleaning, heat treating, forging, press-working, sheet and plate fabrication and assembly, welding, steel-processing furnaces, and manufacturing accessories. Statistics of the A.I.S.I. and S.A.E. specifications and various data sheets.

27b-45. Ferrous Materials for the Engineer. R. Fox. 159 pages. Charles Griffin & Co., Ltd., 42 Drury Lane, London, W. C. 2, England. 12s 6d. net.

The general properties of materials and their testing; types of fracture, microscopic examination, and the various testing methods. The heat treatment of steel and the materials available.

27b-46. Principles of Metallurgy. Ed. 5. Robert S. Williams and Victor O. Homerberg. 319 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $4.00.

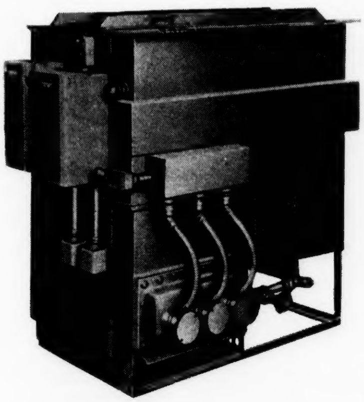
Purpose is to meet the needs of

(Turn to page 62)

NEW PRODUCTS IN REVIEW

DEGREASER WITH QUICK-CONVERSION HEATING (749)

The new Detrex "625" degreaser is a two-dip hand-operated unit for cleaning of medium-sized metal parts of all kinds in machine shops, production, assembly and maintenance departments. It can be heated by steam, gas or electricity, or a combination of these. The main body



construction is so standardized that it can be quickly converted from one type of heating to another for seasonal changes.

The Detrex "625" degreaser employs the immersion-solvent-vapor degreasing process. Production capacity is rated at 1000 lb. of steel parts per hr. This unit will immersion-clean parts that will go into a space 18 x 21 x 12 in.; shafts up to 4 ft. in length can be cleaned by suspending them in the vapor zone.

For further information write George Walter, Detrex Corp., Detroit 32, or use coupon on page 53, circling No. 749.

FURNACE ATMOSPHERE INDICATOR (750)

A new instrument to indicate the relative oxidizing or reducing conditions of the atmosphere within a furnace utilizes the combined physical properties of the mixed gases to obtain an empirical indication free from ambiguous indications.

The gases are continuously analyzed in such a way that a complete record of the furnace conditions during an entire run is furnished automatically on a suitable electrical indicator or recorder. Each gaseous component of combustion contributes to the final reading approximately proportionate to its relative oxidizing or reducing effect. For example, oxygen causes a strong indication to the oxidizing side, while carbon dioxide, carbon monoxide, methane, or hydrogen, cause deflections to the reducing side of the scale to an extent comparable with their common reducing potentialities and their concentrations.

The instrument does not require any adjustments once put into use. The normal furnace controls are operated in the usual manner. The reading of the Engelhard indicator establishes the correct operating point at which subsequent heats can be duplicated. If a more oxidizing or more reducing atmosphere is desired, the operator is guided by the furnace atmosphere indicator in setting the furnace controls.

For further information write Charles Kraus, Charles Engelhard, Inc., 850 Passaic Ave., East Newark, N. J., or use coupon on page 53, circling No. 750.

SPEEDOMAX INSTRUMENT (751)

A new Speedomax instrument automatically logs as many as 160 separate thermocouple temperatures in succession at a rate of 4 sec. per point. Because each point is checked at such frequent intervals, high or low temperatures which may develop can be spotted readily before serious trouble results.

In case of trouble, the operator can cut thermocouples out of the measuring sequence in banks of 20 at a time, until the instrument is concentrated on the particular group of temperatures in which he is interested at the moment. Or, he can set the instrument to record any single thermocouple, or to record all points continuously.

In usual operation, the instrument simply indicates while numbered lights identify each couple. Should any temperature reach a preset limit, the Speedomax automatically starts its recording chart drive, begins to record all points as a series of numbered dots, and operates an alarm.

The equipment consists of two parts, a recorder and a switch assembly — both housed in separate cases.

For further information write K. W. Connors, Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, or use coupon on page 53, circling No. 751.

ALODINE FOR ALUMINUM (752)

A new surface treating chemical for aluminum which produces a protective coating in 2 min. or less is called "Alodine." It can be applied by dipping, spraying (in a power washer), or brushing the aluminum parts.

Dipping parts into a tank of Alodine requires but 2 min.; spraying the work in power spray washer equipment reduces this time to about 20 sec. When the Alodine chemicals are brushed on large surfaces, the coating time ranges from 1 to 5 min.

In actual performance and under severe corrosive conditions, Alodized aluminum compares favorably in its ability to anchor paint and stop corrosion with the best surfaces produced in the most complicated processes.

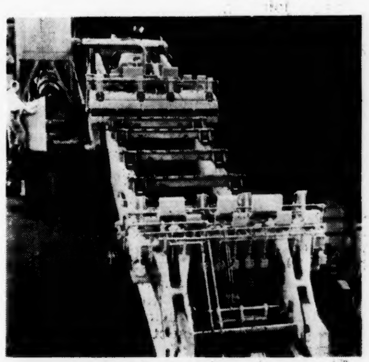
For further information write William Boyer, American Chemical Paint Co., Ambler, Pa., or use coupon on page 53, circling No. 752.

STRETCHER-LEVELLER (753)

A stretcher-leveller of special design, believed to be the largest in the world, was recently incorporated into the production line of a large steel plate mill. The machine is of the self-contained oil-hydraulic type, has a capacity of 1000 tons, and handles plate and sheet up to 11 ft. wide and 31 ft. long.

Two gripheads are provided. The main griphead is actuated by the hydraulic stretching cylinder, while the position of the other griphead is adjustable to compensate for the varying length of the plates. This adjustable head is movable along the stretcher bed by an electric motor and suitable drive. It is secured in operating position by two heavy locking pins operated by air cylinders. Wedge-shaped shoes of special design in the throat of the gripheads grip the plates firmly to withstand the biggest stretching forces.

A straightening device in front of the gripheads is provided to flatten



a warped or bent plate end. The straightening ledge is moved by remote-controlled air cylinders.

A plate support consisting of five movable carriages makes loading and unloading of the plate a very simple process.

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those students of general science or engineering, and those persons engaged in these fields, who are not specializing in metallography, but whose professional work requires some utilization of the subject. Greater emphasis is laid on applications than on theory. Certain practices brought about by World War II have been incorporated.

27b-47. Common Sense in Steel Treating. W. R. Bennett. 86 pages, 1948. W. R. Bennett, Brattleboro, Vt.

The author writes from the standpoint of the oldtime tool hardener—and of the present-day commercial heat treater. He gets all the hard jobs; seldom are there more than a dozen items of the same kind. A day's work may vary from the hardening of striking dies for fancy flat ware, to the mild treatment of some set screws for a little more strength. This is work for a true artisan. The book, therefore, talks the artisan's language and is full of good advice on what to do to trick nature. Only when the author attempts to give a scientific explanation does he fall into traps. The reader will do well to heed the practical advice; ignore the attempted theorizing. E.E.T.

27c—Nonferrous

27c-17. German Non-Ferrous Foundry Industry. 131 pages. Office of Technical Services, Dept. of Commerce, Washington. (PB-34011). $3.50.

Practices observed at 18 German firms, particularly in respect to centrifugal casting methods. The coating of steel gear wheels with bronze by a casting process is cited as one of the most important processes developed in German industry.

27d—Light Metals

27d-17. Aluminium: Fabricage, Verwerking en Toepassings-Mogeliukheden. (Aluminum: Its Production, Fabrication, and Applications.) J. K. Van de Loo. 127 pages. 1948. Vitgevers Mij. Diligentia, Amsterdam, The Netherlands.

A concise survey of the production, properties, fabrication, and applications of Al and Al alloys. Recovery from bauxite, casting, forming, joining, machining, surface treatment.

27d-18. Anodic Oxidation of Aluminium and Its Alloys. 64 pages. Aluminium Development Association, 33, Grosvenor St., London, W. 1, England. 1s.

The procedure common to all processes and methods involving chromic, sulphuric, and oxalic acids. Dyeing procedure.

27d-19. Designing for Alcoa Die Castings. 188 pages, 1948. Aluminum Company of America, Gulf Bldg., Pittsburgh 19, Pa. $1.00.

After several chapters presenting fundamentals of die-casting machines, dies and alloys, a comprehensive 80-page section deals with various phases of casting design. The final sections are devoted to machining, finishing, inspecting, Alcoa facilities, and a glossary of die-casting terms.

27d-20. The Aluminum Cartel. Louis Marlio. 130 pages. 1947. The Brookings Institution, 722 Jackson Place, N. W., Washington 6, D. C. $1.50.

A case study of one of the most important international cartels in the industrial field. Problems and policies relevant to all types of cartel organizations. History of numerous cartel agreements from 1901-1939.

27d-21. Werkstoff Aluminium und Seine anodische Oxydation. (Aluminum and Its Anodic Oxidation.) Max Schenk. 1042 pages. 1948. A. Francke, AG, Berne, Switzerland.

A comprehensive handbook on aluminium and its alloys with special emphasis on the process of anodizing and properties of anodized aluminum articles. Historical survey; metallography and properties of Al and its alloys; methods of joining and heat treating; chemical and electrochemical behavior; corrosion resistance; surface treatments; and testing methods. Anodizing patents.

27d-22. Aluminum Alloys and Mill Products. 162 pages, 1948. Reynolds Metals Co., 2500 So. Third St., Louisville, Ky. $1.

A data book on aluminum alloys covering alloy designation systems, tempers, sizes, shapes, physical properties, chemical properties, mechanical properties and fabricating characteristics. Wrought aluminum mill products and methods of producing them. Casting alloys, and pig and ingot products.

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